SUPPLEMENT.

The Mining Journal,

RAILWAY AND COMMERCIAL GAZETTE:

FORMING A COMPLETE RECORD OF THE PROCEEDINGS OF ALL PUBLIC COMPANIES.

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Original Correspondence.

TRELOGAN MINES, FLINTSHIRE.

The Trelogan mines produce both lead ore and blende, which are found in black chert, on the mountain limestone formation. About 130 tons of blende and 50 tons of lead are produced per month. The sett is 500 acres, lying in the Mostyn district. Not less than 1300 tons per month of raw material is raised, producing about 15 per cent. of prepared metal. This is raised at one pit, which is divided as a pump-shaft, and another shaft for raising ore. This pit was an old one re-opened; it was originally 9 ft. in diameter; it was enlarged to 12 ft. down to the adit level, 74 yards depth; from thence to 143 yards depth the pit was not enlarged, preserving its original size—9 ft. From 143 to 213 yards depth the size is 12 ft. In consequence of the pit being so contracted from 74 to 143 yards, plunger-lifts could not be placed in it, accordingly bucket-lifts only are fixed below the adit. Another pit on the property serves the purposes of ventilation, and for ingress and egress to and from the underground levels by means of ladders. The pumping engine is of the Cornish type, built at Burnley, in 1864, and is of remarkable strength in all its working parts. The cylinder is 80 in. in diameter, 10-ft. stroke, 9 ft. in the pit, 30 lbs. steam pressure, condensing. The piston-rod is of steel, 9 in. diameter. The cylinder has an outer casing of metal. The two cast-iron plates of the beam weigh 32 tons. The engine goes day and night, at the rate of two strokes per minute, standing on Sundays only. It works one 14-in. plunger-lift from the adit to the surface, 74 yards in depth, which raises water for condensation and for washing the ore. There are three bucket-lifts below this—an 18¾-in. from the bottom 213 yards, 20 yards long, an 18¼-in., 50 yards long, and an 18-in. bucket, 69 yards in length, up to the adit.

The drawing-engine has two 12-in. horizontal cylinders, 3-ft. stroke, on third motion, with one round wire-rope, drum, and kibble. The kibble is guided by two wire-rope guides and carrier to the depth of 143 yards, on account of the contraction of the shaft from 74 to 143 yards. The carrier rests on beams at 143 yards in its descent, below that the kibble is run up and down without guides, on coming up to that point the carrier is raised with it.

An engine of 15-in. horizontal cylinder, 2-ft. stroke, on second motion, drives the crushing rolls, of which there are two pairs—the upper pair are corrugated, the lower pair are plain. The whole of the raw material drawn, about 1300 tons per month, passes through these crushers. It works also the rotary sieve and the rotary elevator. This engine, by means of bevel wheels and shafting, gives motion to eight jiggers. The same engine is also attached to a capstan when required, working on third motion.

On the dressing-floors there are several flat and running buddles; these, with the jiggers, are all covered with a light roof, composed of wood and felt. Below these there are settling pits, also four rotary buddles, and two brush or vibrating buddles; a small water-wheel gives motion to these. The refuse from all these processes is again treated in other running buddles, the object being to obtain a complete separation of the lead and blende from the waste. Machinery is used to a much greater extent than is here described for this purpose, and is well worthy a visit of inspection. It is, probably, the best arrangement of dressing-floors in Wales; the machinery brought into requisition is both economical and necessary in obtaining as perfect a separation of the metal as possible, in order to produce good results as to dividends. One stream of water serves for all these operations, and gives motion to the water-wheel.

The principal metallic veins at Trelogan run in an east and west direction, but the minor veins, running in many various directions, are somewhat remarkable and distinctive, compared with the regular running veins of some mines. These minor veins, intersecting the east and west ones, are generally found to serve as feeders to them. The workshops include smiths' and joiners' shops; the latter contains a 12-in. horizontal engine, which drives a circular saw, a lathe, and drilling-machine, and is also used for grinding horses' food, the Trelogan Company being the lessees of a farm of 120 acres.

THE COED TALON AND LEESWOOD COLLIERIES, FLINTSHIRE.

The Coed Talon Coal Company have five pits in operation, two for raising the Main steam coal, and three for raising Cannel. The royalty is leased from the lords of Mold, and from five other landlords, and is 950 acres in area. Commencing at the south end of the royalty, the Wood Pit comes first in order; it is 60 yards in depth to the Main coal seam, which is now but partially worked, being nearly exhausted. The pumping-engine erected here has a 36-inch horizontal cylinder, non-condensing, working a bucket-lift with horizontal rod and T-bob. The Deep Pit, which has lately been sunk, is 240 yards in depth to the Cannel seam. The winding-engine has two 24-inch horizontal cylinders, 5 feet stroke, direct-acting, non-condensing; two flat wire-rope drums, 10 feet in diameter. Cannel is raised with one rope, and water by tanks with the other; these run on two wire-rope guides. The water will be raised eventually by a double-pumping steam-engine, placed at the bottom of the pit, and Cannel raised by both ropes. The section of Cannel at this pit is—

Conglomerate rock roof, 3 ft. thick.

1.—Smooth Cannel	1 ft.	2 in.
2.—Curley Cannel	1	0
3.—Inferior oil shale	0	4
4.—Coal	0	10=3 ft. 4 in.

5.—Underclay, with balls of ironstone.

The holing is made in the coal. The shale is not productive for oil manufacture. The Deep Pit is sunk near the edge of a piece of barren ground in the Cannel measures, 650 yards in breadth, running across the royalty in a direction north 25° east. It is a conglomerate of rock and Cannel, and supposed by Mr. Dougan to be a wash formed by an ancient river, at the time that the Cannel and the adjacent strata were in course of formation. The Wall and Bench seam, 22 yards below the Cannel, is not affected by it; neither is the seam 20 yards above, and others higher up, at all affected. The ground in the Cannel has been proving by drifting through the wash, which is altogether valueless, and dead ground. The Deep Pit is sunk in a trough; the coal measures are found to rise from it on all sides, and conform to the slope of the hills on the east and west.

The South Level Pits are 130 yards deep to the Main coal seam Two pits are sunk, about 10 yds. apart; the coal pit is 10 ft. in diameter; the pump pit, also the upcast, is 6 ft. in diameter. The winding-engine has one 36-in. horizontal cylinder, 6 ft. stroke, direct-acting; two flat wire-rope drums; it raises one large tub in each cage; these run on wire-rope guides. The pumping engine is on the direct-acting and Bull principle combined. It was originally built with one 53-inch cylinder, placed at the side of the pit, the piston-rod working down to a wrought-iron beam fixed at one end, the pump-rod being attached near the other end, giving 11 feet stroke in the pumps. Another cylinder has been found necessary to be added, to increase its power; this is fixed directly over the pit, its piston-rod working to the extreme end of the beam. The steam is condensed. The engine goes day and night 3 strokes per minute, but can be driven 6 strokes. There are two 22-inch bucket lifts in the pit, each 65 yards in length, one delivering near the surface. A horizontal steam cylinder, air-compressing cylinder and air-receiver, is erected at the top of the pits, for supplying air in pipes to an engine placed in the Main coal seam, 500 yards from the pit bottom. This air-engine has two 10-inch horizontal cylinders, working at 60 lbs. pressure. Another engine is in operation at the top of the pit, driving a circular saw. There are six plain cylindrical boilers supplying these engines with steam at 35 lbs. pressure. At the Cae Blyddn Pits Cannel is raised from the depth of 156 yards. There are two pits, about 10 yards apart, in front of the winding-engine; in one water only is raised by a tank; in the other, which is the upcast for the Deep Pit, Cannel is raised in one cage, holding two 6-cwt. tubs on one deck. The cage and tank run on two wire-rope guides. The winding-engine is composed of two vertical beam-engines coupled together, one being 20-inch, the other an 18-inch cylinder, 4 feet stroke in each case; two flat wire-rope drums. The section of Cannel at this pit is—

Black shale roof, produces 10 gallons of oil per ton.

1.—Smooth Cannel	2 ft.	6 in.
2.—Curley Cannel	1	6
3.—Shaley Cannel	1	3=5 ft. 3 in.

Fire-clay.

Besides being thicker than that at the Deep pit, this is the best in quality in the Leeswood district, the Curley Cannel being celebrated for its high illuminating power. The relative value of the Cannel and shale for gas and oil manufacture is shown in the following table:

	Galls. of oil produced from 1 ton.	Gas made from 1 ton in cubic feet.	Illuminating power in sperm candles.
1.—Smooth Cannel	55 to 40	10,800	28
2.—Curley Cannel	75 to 80	13,600	28
3.—Shale, or inferior Cannel	33	10,780	14

The Newcastle coal produces gas of 12-candle power; a mixture of these varieties of Cannel is used with it at many large gas works in London and elsewhere, to raise the gas to the standard of 15, or a higher illuminating power. Between the Cae-Blyddn and South Level Pits a fault occurs, downthrow to south 15 yards, running through Langford Pit, now discontinued. On the north side of this fault the Cannel is of superior quality and greater thickness, as shown by the sections. Another fault, upthrow to the north 70 yards, occurs some distance north of Cae Blyddn Pits. The Little Cae Blyddn Pits, further north of the 70-yards fault, are sunk to the Cannel at the depth of 40 yards only. A small horizontal engine raises Cannel by two flat wire-ropes, and another horizontal single engine pumps water with horizontal rod and T-bob in one bucket lift. Both engines are on the second motion, and non-condensing.

About 500 tons per day of coal and Cannel is raised at Coed Talon Pits. The Main coal is sent to Holyhead to supply the Dublin and Holyhead steamers entirely. The Main coal has been worked on this property for 100 years and more, it is now greatly exhausted; the thickness of clean coal varies from 10 to 12 feet, occasionally it has has been found 16 feet. It is worked on the stall and pillar system, and is calculated to produce from every acre 12,000 tons of coal. Ninety-five yards below the Main coal is found the Cannel seam; its valuable properties do not seem to have been known until the year 1862, nine years ago, for previous to that it had been but little worked in the neighbourhood. At that time, however, a great demand for this Cannel arose, not only for gas-making, but for the manufacture of oil, for which the curley variety of Cannel is peculiarly adapted. At the present time the Coed Talon Company send most of their smooth Cannel to Manchester for gas manufacture, and the curley Cannel is sent to the Flintshire Oil Company's Works, at Saltney and Leeswood. There are eight oil proprietories, whose works are at Leeswood, or the immediate neighbourhood—the Flintshire Oil Company, Mr. Marston's, Nerquis Oil Company, Coppa Oil Company, Mr. Birkbeck's, Mr. Milthorp's, at Padeswood, Pearse and Wilcox's, at Hope Junction, and the Canneline Company. The Flintshire Company manufacture more oil than all the others combined; their works at Leeswood appear in full operation. Of the other works, at and near Leeswood alluded to, probably not more than one-fourth of the appliances erected for extracting and refining oil are at present in action. This is due to the low price for which American oil is sold, and has caused the collapse in the local trade, from which at the outset great profits were expected.

Of the other four coal companies who raise Cannel, the Leeswood Green Company possess some of the prime quality. The royalty is 260 acres; about 300 persons are employed at their works. Their Cannel pit is adjacent to the Cae Blyddn Pits of Coed Talon. The Leeswood Green Pit is 170 yards in depth. About 100 tons of Cannel is raised per day. The winding-engine, built in 1862, has two 18-in. cylinders, horizontal, 3-ft. stroke, direct acting, two 8-ft. flat wire-rope drums, 40 lbs. steam pressure, three plain boilers. The water is raised at nights in tanks by this engine. Wire-rope guides are used. The Wall and Bench seam is also worked and raised from the upcast pit, adjacent to the former, by a small engine, 15 in. horizontal, and one flat wire-rope. The Leeswood Hill Company had several pits for the extraction of Cannel; the working of these is at present entirely suspended, principally, it is said, owing to faulty ground, and the Cannel being of an inferior quality, compared to that at the adjoining collieries. The Coppa Coal Company, the Nerquis Coal Company, and the Tryddn Company also raised Cannel of a similar quality to that found at Leeswood Green.

UTILISATION OF REFUSE SHALE.

Sir,—If it should prove a fact that our coal fields will be exhausted in thirty years hence, I think it is also a fact that there is in this country shale sufficient, if properly utilised, to supply us with heat and light for many centuries to come, and, perhaps, at a cheaper rate than the present price of coals. We have only to forego our old system of grates, &c., and introduce, or replace them with, a far more economical and graceful apparatus for our domestic and manufacturing purposes. For we have all, and more than all, the elements in shale that we get at present from coal. Take the crude product (or oil) from shale, we find it contains—1. Spirit, or benzoline.—2. Paraffin oil.—3. Lubricating oil.—4. Paraffin wax.—5. Machine grease. Take away the two first, which is readily done by distillation, and you will still have left a substitute for coal.

I just throw out these few practical hints for the benefit of those of your readers who may be interested in the matter, and would use the old proverb—Wilful waste makes woful want.

West Bromwich, April 11. —— E. G. Buttery.

COAL BETWEEN THE SOUTH STAFFORDSHIRE AND SHROPSHIRE FIELDS—No. II.

Sir,—My previous communication on this subject, which was published in the Supplement to the *Mining Journal* of March 26, I concluded somewhat abruptly while describing the second section of the gate-roads towards, and heading made in the fault; I will now give the various measures gone through in the heading. They are as follows:—White Rock, Light Blue Shale, Dark Rock, White Rock, Fire-Clay, Soft Dark Ground, Light Rock, large piece or nodule of Sandstone, Light Blue Shale, White Sandstone Rock, Light Sandstone Rock, White Shale, Sandstone Rock, Irregular Rock, similar to measures above Thick coal, nodules of Sandstone Rock, Blue Measures of Shale, same as above Thick coal, Fire-Clay, with nodules of Ironstone, White Blue Binds, Light Blue Rock, piece of Coal, supposed to be Flying Reed, Tough Parting, Red Rock, Mottled Ground, nodules of Ironstone, Hard Red Rock, Soft Parting, Light Red Rock, Light Red Rock very full of joints. It will be seen that in this heading there are nearly all the measures in a vertical position, found horizontally in sinking the shafts; some of them are much compressed, while others are wanting. The piece of coal supposed to be Flying Reed, but which, I think, belongs to one of the seams found nearer the surface, comes in in the shape of a wedge. The last four measures named are of the Permian formation. The heading is 30 yards in length, and a jackey pit would have been sunk at its termination, but Mr. Spruce, the mine agent, was afraid of tapping water, which is often found in the Permians, and would in this case have drowned out the workings. In a gate-road, just before the finish of the bottom of the Thick coal, a jackey pit is sunk, and shows Blactery measures, Whitery measures, no Heathen coal, Gubbin, Rubble, and the other measures, very much confused, White and Penny measures, Stinking coal, Fire-Clay Rock with balls of stone, Fire-Clay coal, Dark Fire-Clay, Fire-Clay, with balls of stone.

Before giving my opinions, and drawing any conclusions from the foregoing particulars, I will give the section of a shaft sunk at Compton, near Enville, on property belonging to the Earl of Stamford and Warrington. Enville is situate between the South Staffordshire and Shropshire faults, about four miles from the former in a southerly direction, at a place where the Permian rocks are largely developed. The shaft is sunk to the depth of 128 yards 2 feet 6 inches, and at the bottom a bore-hole is sunk 61 yards 2 feet 3 inches. They had to discontinue because of the water, which was rather troublesome. The spot chosen was near what was called by the master sinker a "thing"—a common expression used in this district for a fault—but what, in my opinion, is merely an outcropping of the Permian rocks, and where the coal measures become exposed. A bore-hole was also made for nearly 200 yards into the Permians, at a little distance from their outcrop, but with no success, as they were unable to discover anything but Permian strata, and it was found too expensive to sink the hole deeper. The following is the section of the shaft:—

	Yds.	ft.	in.
Soil	0	1	0
Clay	2	2	0
Mottled ground	4	0	6
Light blue ground	0	3	0
Mottled ground	2	0	0
Light blue binds	0	2	6
Brown rock	4	2	0
Light blue ground	0	1	6
Strong rock binds	4	0	0
Tough parting	0	0	4
Light blue binds	1	0	0
Dark binds	1	1	0
Coal	0	0	4
Dark fire-clay	0	1	6
Sulphur coal	0	1	0
Dark fire-clay	1	2	0
Rough rock	2	0	0
Dark fire-clay	1	2	0
White rock	3	0	0
Mottled ground	1	0	0
Strong rock binds	1	1	0
Light blue binds	1	2	0
Rough blue rock	14	2	0
Peldon	1	0	0
Mottled ground	4	0	0
Blue binds	6	0	0
Coal	0	0	10
Dark fire-clay	0	2	6
Light fire-clay	1	2	0
Strong mottled ground	2	0	6
Coal	0	0	2
Soft blue ground	0	2	6
Light blue rock	1	1	0
Strong blue ground	2	2	6
Hard blue rock	10	1	0
Dark fire-clay	1	1	0
Light blue ground	3	0	0
Strong rock binds	2	0	0
Strong dark blue binds	4	1	0
Rock and Peldon	1	0	0
Dark blue binds	1	1	0
Dark sheddy rock	1	0	0
Soft Parting	0	0	3
Coal	0	0	10
Dark fire-clay	1	0	0
Strong rock binds	2	0	0
Tough parting	0	0	6
Light blue binds	0	2	0
Dark blue binds	2	1	0
Coal	0	0	3
Strong light fire-clay	1	0	0
Bleeding rock	23	0	0
Mottled ground	1	0	0
Light blue ground	1	1	0
Total	128	2	6

Bore-hole made at bottom of shaft:—

	Yds.	ft.	in.
Dark mottled ground	2	0	0
Light blue ground	3	0	0
Strong rock binds	3	2	0
White rock	6	0	0
Light blue ground	3	2	0
Dark fire-clay	0	1	6
Coal	0	1	3
Fire-clay	0	1	6
Coal	0	0	6
Dark fire-clay	0	1	0
Light blue ground	1	1	0
White rock	6	0	0
Mottled ground	13	0	0
Dark grey rock	6	0	0
Dark binds	5	0	0
Mottled ground	2	0	0
Dark fire-clay	2	0	0
Dark blue binds	2	2	0
Coal	0	1	6
Dark fire-clay	1	2	0
Mottled ground	1	1	0
Total	61	2	3

It will be seen from this section that the first coal of any importance struck is called Sulphur coal, and is maintained to be such by Mr. Beardsmore, the master sinker, although others in authority would hardly believe it to be the case; but Mr. Beardsmore, who is a man of as much practical experience as any in South Staffordshire, informs me that he washed the coal, and tried it in every possible way, and is quite convinced that it is the Staffordshire Sulphur, or Stinking coal. There is this to be said for those who would not accept this belief, that it would be rather against the grain for them to do so, as they were aware that if such were the case there would be no possibility of finding either the Brooch, Thick, or Heathen coals, the Sulphur coal always lying below them, and also the Ironstone measures. A survey of the measures found below the last-named coal in this shaft quite convinced me that the Thick coal, &c., have here been denuded, for they correspond with the measures found

below it in the South Staffordshire field. The coal measures where this shaft is sunk continue for a good distance, and there are some pits getting the Thin seams shown in the section, at a place called Chatterford.

Returning again to the South Staffordshire western boundary fault, it is my opinion, after thoroughly examining the particulars laid down, and also making a personal examination of the headings, &c., that the above is a clean cut fault, but that there has also been denudation, and also, where these researches are made, a rock fault. My reasons for this opinion are, in the first place, that the regular course of the fault from north to south, and when curves occur they are of a regular sweep, making a bold indentation either in or out, were this fault the result entirely of denudation the line would show, like those of the north and south boundary, an indented and an irregular coast line, and the measures would also finish in a different way—that is, in a similar manner to those in the Symon fault of Shropshire, where the lower measures finish a much greater distance under the Permians than the upper ones, showing a slanting sea bottom, but this is not the case, for everywhere the fault has been explored it shows that the coal measures are taken off by almost a vertical cut, the lower measures protruding in few instances far beyond the upper ones. There are evidences of denudation of the coal measures between here and Shropshire, a denudation that took place towards the close of the Carboniferous age, and before the Permians were deposited. There seems to me to be evidences of this at the spot from which I gleaned these particulars. I am not wholly convinced upon it, but yet I cling to the belief, for if the second section of gate-roads and heading I described in my first letter is looked well into it will be seen that there the Thick coal ends in a downward direction, and that the measures which lie horizontally above it have come down over it into a vertical position before the Permians set in, this may have taken place at the time of the fault, but it seems to me that there has been an under washing, for it will be remembered I remarked, as a curious fact, that the batt at the bottom of the Thick coal did not finish in its proper place, but ran, as it were, horizontally across the seams which ended vertically: this I think could only be produced by the bottom portions being washed out, and the strata above falling over to fill its place. The strata in the heading seems to show, by the way they are mixed up, evidences of denudation; and I may state that this is the opinion formed by all those connected with the making of the heading. It will be noticed that at the termination of the Thick coal in the first section of gate-road and heading that the coal thins as it nears the fault, and it, with some of the under measures, turns up almost over it. This, in my opinion, is due to lateral pressure. There are also circumstances caused by it in the second section. In the section given of No. 7 pit shafts, the upper part of the Thick coal is called Chance coal, because it is so intermixed with white sandstone rock, some parts of which are mixed up with nodules of ironstone. These circumstances have nothing to do with the boundary fault; it is merely an instance of a rock fault, of which I could give several in this district, the sandstone having been deposited in the coal at its formation. I will now give the opinion of a few well-known geologists on this fault. The late Mr. J. Beete Jukes, M.A., F.R.S., &c. (than whom a better authority on the South Staffordshire coal field does not exist), says it is the result of denudation, combined with a great longitudinal fault. Prof. Beckett, of Wolverhampton, a clever geologist, and well acquainted with this district, is, I think, of the same opinion, and believes that coal will be found under the Permians, beyond the fault, at no very great depth. I will here give fully the opinion expressed by Prof. Randall, after visiting the second heading with the Dudley Geological Society, last summer. I took full note of it at the time, knowing this gentleman to be an excellent authority, as far as Shropshire is concerned. He said he thought it would be rash on his part to offer an opinion after the brief inspection they had made. He could speak more freely on the corresponding fault in Shropshire. He thought that both among practical men and others, as well as among those who conducted the Government Survey, the conclusion arrived at was that the coal at the boundary fault had been cut off by some sudden downthrow. This view was held for some time, and the fault was marked on the Ordnance Map as a clean cut fault. Government officials, however, had been qualifying their views on the subject, which views would doubtless be duly published. Government surveyors should not be blamed for coming to the before-named conclusion, and those who had the opportunity of going below and studying and looking into the matter while mining operations were going on were more ably qualified to form an opinion now than they were 25 years ago. At one place in his own district, near a great fault, he had observed appearances in the measures similar to those seen that day. There was an upthrow in some places and a downthrow in others, and also the measures in a perpendicular position, as he had witnessed them in this pit. He could understand that a vast body of water in connection with a long, uniform line of coal had cut into the soft and uniform stratum, undermining it, and letting it down, as had been seen by them that day, and as might be seen in Shropshire. Some interesting facts had been brought to light in sinking a pit belonging to the Madeley Wood Colliery. In sinking that pit, after passing the top coal, they came upon a bit which clearly showed where denudation had set in, and so plain was this that no one could mistake the indications presented. The top coal portion was slanted off, the edges seemed split open, and a whitish mud filled the crevices, while there were to be found little bits of coal broken off by the play of the waves, and mixed with rounded pebbles. It was his opinion that denudation took place long before the Permian rocks were deposited. He held with the theory of others, that taking the south-east side, there was little coal between the South Staffordshire and Shropshire coal fields: their hopes, he thought, lay towards the north-east; the Cannock Chase field was a connecting link. When they came to examine the country, they would find a circuitous and continuous coast line, and along that line they would find a coal strata. Disturbances had taken place along the edges of the denudation, and these had led people astray. He also added that, from a remark in Prof. Jukes's book, he seemed to have come to the conclusion that the fault was the result of denudation, he afterwards altered that opinion, and it now appeared to him that Prof. Jukes was coming round to his first conclusion.

Mr. Randall evidently concludes that this fault is the other side of the valley of denudation between here and Shropshire; but that gentleman, as he observes, could hardly form an opinion from what he saw that day, and the heading he visited is the one that I before observed shows great evidence of washing. It is my opinion that in some places between here and Shropshire the upper coal measures are denuded, and in some instances as far as the Thick coal, as shown in the section of shaft at Enville; but it may be possible that the Thick coal is there under the Permians, but crops out with them. That Thick coal exists between here and Shropshire I feel quite sure, but it will be, I think, uncertain where to find it. I should like, as I before stated, to hear the opinion of some gentlemen well acquainted with the Shropshire field.—*Dudley.* COLLIERY ENGINEER.

MINING IN CALIFORNIA.

SIR,—You will see by the enclosed report that Col. Sidney O'Conner has been here, and has again left for London. I sincerely hope he will succeed in forming a company to work his mine. I have not the least doubt but that the Grass Valley Consolidated will make a permanent dividend-paying mine.

I was in San Francisco about two weeks since, and saw Mr. J. S. Phillips, formerly of North Pool Mine; I was glad to find that he is doing well, and is about to send occasional contributions to the Journal—what may be termed *our paper*.

The success attending Mr. Batters's purchase of the Union Hill Mine has caused quite an excitement in the neighbourhood of Grass Valley. I was going to say that "One and All" are prospecting for quartz ledges, and many abandoned mines have started up within the last two months. In a former communication I mentioned about a rich strike in gravel diggings on Randolph Flat, three miles west of Grass Valley. To show the richness of these diggings, last week the party took out 16 ozs. in two pans of gravel—a pan contains (say) 15 lbs. THOS. FAULL.

Union Hill, Grass Valley, California, March 16.

GRASS VALLEY CONSOLIDATED.—There is not much doing at present. A few men are employed in taking out rock, which is looking exceedingly well—computed worth £30 per ton. Col. Sidney O'Conner has been here, and made arrangements for the purchase of a 20-stamp mill. When the said mill is being erected we shall employ some 70 men, and shall be in a position to make large and profitable returns. The Colonel left here some few days ago for London, England, to make arrangements for working this mine on an extensive scale.—THOMAS FAULL: *Grass Valley Consolidated, March* 16.

GREENHORN (California).—The lode in the stopes south of tunnel is 5 ft. wide, yielding well in gold. The lode in the north stopes is 4 ft. wide, also yielding well. The lode in the north drift is 2 ft. wide, and improving. Eight men are all that is employed in the mine to keep the 8-stamp mill running day and night. Nine days' run in this (March) month cleaned up $2600. The blankets prospect well, and, as there is amalgam on hand, we expect our returns will exceed the returns for February—$7000.—THOMAS FAULL: *Greenhorn Mine, March* 15.

[ADVERTISEMENT.]

THE CUIABA GOLD MINING COMPANY.

SIR,—I consider it a matter of justice to the subscribers to the above company to state that I am the holder of all the title-deeds of these properties, as the purchaser, also as sole surviving director of the late National Brazilian Mining Association, and that the production of these documents before the Brazilian Court will, in accordance with their mining code, cause the immediate eviction of any holders, however long in possession. I beg further to state that I am also the holder of the original grants from the Crown, absolutely necessary for the settlement of boundaries, and invaluable in the event of large discoveries of gold. In respect to any pretended claims against me, I am, as I have always been, ready to submit to arbitration, or I am prepared to make over all the properties, with the title-deeds and original grants, upon an agreement that every account in England should be examined by public accountants, and also every claim in Brazil by public accountants appointed by the Brazilian Courts for that purpose; and that a legal bond, signed by responsible parties, should be given to me for the payment of such amounts as may be awarded in my favour.

April 9. EDWARD OXENFORD.

MINING IN PRUSSIA.

SIR,—In last week's Journal there is a typographical error, which may have misled your general readers. The paragraph is, "Lastly, the mines (Prussian) are held in perpetuity at *one-fiftieth*, or 2 per cent. royalty, whilst British mines pay an average royalty of *one-fiftieth*." This latter *fiftieth* should have been *fifteenth*. It is obvious that the difference between *one-fiftieth* and *one-fifteenth* on the *produce* of a mine leaves an immense advantage on the side of the Prussian *shareholders*, whilst the fact that the mines are held in *perpetuity* guards the Prussian shareholder against the immense fines imposed in many cases on successful enterprise. Instance the amount exacted for the renewal of the leases of Consols, Devon Great Consols, Wheal Phœnix, and many other cases which your readers will remember.

ANGLO-PRUSSIAN.

THE CARDIGAN AND MONTGOMERYSHIRE MINES IN DEPTH.

SIR,—A great deal has been said on this subject, and I think a few remarks on it will be perused with interest by your readers. I will first state that the rock is clay-slate, which dips under the Red Sandstone and the coal and iron districts of Glamorganshire to the southward and northward under the same geological series as developed in Flintshire and Cheshire. There is no doubt that the clay-slate will last down to a depth of more than a mile.

The deepest mine worked is the East Darren, which is down 124 fms. under adit, the adit itself being 16 fms. The adit level is 34 fms. above sea level, and, consequently, the mine is 80 fms. under the level of the sea. At this point the ore is rich, and looks as fresh as it did at either level in the mine. South Darren is to within about 10 fms. of being as deep, with good courses of ore. Bronfloyd is the same depth, and very rich in ore. Goginan is about the same depth, and the bottom of the deepest level worked away on tribute. The water some time ago let in at Cwm Erfin, supposing no ore existed in the deeper levels, has been taken out, and good discoveries made. I do not wish to trespass at great length on your valuable space. These are sufficient instances to convince the most sceptical. I will only add that I look upon the great Snowdonian range of hills, standing in the midst of the mines of the two counties, to be the real cause of the mineral production, and what is found on one side will be found on the other.—*Goginan, April* 11. ABSALOM FRANCIS.

MINING IN CORNWALL—ROCHE AND LANIVET.

SIR,—In a local paper a statement is put forth that no fresh mines are being started in Cornwall. I think the writer must have made a mistake, and the small "no" should have been left out. On a recent tour I was delighted to see so much activity springing up in every direction—new mines started, and old ones being re-worked. But one part of the county struck me more than any other, it being a condemned district before. I mean the tract of land, or waste, from the St. Columb road to Bodmin. Within seven miles there are six mines; five are quite fresh undertakings, and one has been in work some two years; and, from all the indications, every one will pay the adventurers for their outlay. The ROYALTON MINE comes first, and under present management, both local and London, the mine bids fair in six months to be in a paying state for the adventurers. Expenses are cut down wholesale, as the next report will show, and ore is being found in quantities that will pay well. This is an open cutting, and the ore is quarried; the timber, therefore, required is very little, and the expenses are very much less than in shafts and driving. About two miles further on comes GREAT ROYALTON, a new mine, and so far as proven shows signs of being one of the best, if not the best, in the district. An engine-house is being covered in, and the 28-in. engine is lying on the sett, only waiting the completion of its future abode. The tin found here (and immense quantities of it have been found) is of the finest quality. Its prospects are more than good, and the last call, it is hoped, will bring the mine into work, and be the last draw from the shareholders.

A mile further on comes BRYN ROYALTON CONSOLS. This is also a new undertaking, and is nearly in the same progressive state as Great Royalton, save that the engine is not on the sett, but from what was said it appears to be on its road there from Penzance. The works here are, I believe, to be open; as in the case of Royalton, a tramway has been laid down, and about, I judge, 10 fathoms more have to be driven before cutting the lode. On the hill, ¼ mile above the last-named sett, a mine is being privately worked by some Liverpool gentleman, I believe; of their prospects, however, one cannot judge, as everything is kept strictly private. The last mine that was started is the ROCHE CONSOLS; this is situate just above Great Royalton, and is likely to prove a good success if funds are forthcoming to purchase the necessary works for its development. The nearest mine to Bodmin is the REPERRY, so called from the manner in which it is situate. Works have been carried on here for nearly eight months proving, and the adventurers are well pleased with their success. The mine is being opened in a proper manner, and a 30-in. engine is being erected. From this mine in three weeks, at a depth of 15 fms., 2 tons of tin were sent to Messrs. Martin, of St. Austell, and 2 tons are ready for sale against next account, so the last report says. This is wonderful, indeed, inasmuch as only four heads were used in stamping. The purser asks if such a thing has been done before. I, for myself, do not think it has.

If the information I have given be thought by you to be worthy of publication, you are at liberty to insert it in the *Mining Journal*. It will at least show that the Roche and Lanivet districts are not asleep now tin is at such a good price. May it continue so, and be a benefit to miners and shareholders. "One and All."—*Torquay, April* 13. G. T.

MINING IN ST. AGNES, CORNWALL.

SIR,—Travelling lately in Cornwall, my attention has been directed to the mines in St. Agnes by a map recently published by Messrs. Symons and Son, of Truro—and a very neatly-executed map it is. It contains the whole parish, and a portion of Illogan. I find, on the eastern boundary, adjoining Perranzabuloe, GREAT WEST CHIVERTON MINE, managed by an intelligent agent (Capt. Stickland). The water is discharged by a very small engine, which will try the lodes probably 30 fms. under adit. By the time that that level is reached some knowledge of a more decided character will be acquired of the contents of the several lodes and branches, of which eight have been discovered at surface, but on two only are operations carried on at present. Argentiferous lead, of good quality, is found in small quantities, indicative of larger. The prospects are cheering. WHEAL DAVEY, adjoining the last-named mine at the west is, and has been for many years, idle, but is said to be in the possession of the Great West Chiverton Company, and will be re-worked by them at no distant period. It is said to be deserving of a trial of more energetic kind than that formerly given to it. Immediately west of Wheal Davey is OLD EAST TYWARNHAILE, also idle, but whose working will, doubtless, succeed that of Wheal Davey, if not worked in conjunction therewith. This is Duchy (mineral) land, but Wheal Davey and Great West Chiverton are in Mithian Manor, the property of Messrs. Davey. WHEAL VALLEY, north of Wheal Davey, is also idle, and has been for thirty or forty years. I met with no person to give me any further information thereon. WHEAL LIBERTY and WHEAL MITHIAN were slightly worked, shallow, about thirty years ago, on two lodes—unproductive so far as known. Northward from Great West Chiverton lies PRINCE ROYAL MINE, a very promising sett, situate near the celebrated Perran St. George Mine, so very productive thirty-five years ago. There are several lodes here, of good promise, which run into the BLUE HILLS MINE, at the west, where a large steam-engine has been erected—in the wrong place—and a winding and stamping engine. This is said to be a good mine for the future. WHEAL PRUDENCE adjoins Blue Hills. It has been tried several times, and I suppose will be tried again. It is a pity that when the last excellent machinery was in the mine the company did not give it a fair trial. TRESLOW lies east of Wheal Prudence. I know it only by name. PENHALLS, west of Blue Hills, an old mine, now working at a profit on tin. WHEAL KITTY, a rich tin mine, south of Penhalls, and in contiguity therewith, is managed by Capt. Wm. Teague, of Tincroft, who in six years has realised 100,000*l*. SOUTH KITTY, lies south of Wheal Kitty, and is, or was, in grant to Capt. Richard Pryor, who formerly managed Wheal Kitty. I suppose Capt. Pryor, who has several good mines under his management, will return to South Kitty some day, and work it. He also had GOONINNIS, at the west, but Capt. Bray, of St. Agnes village, has it now, and it is said that a Truro company are about to work it. It has several lodes, all of which are said to be in virgin ground. One of Wheal Kitty lodes intersects the sett. That this is a valuable piece of mineral ground I have no doubt. Westward of Goonninis lies PENWINNICK, idle, formerly worked by the late Mr. Carne. West of Wheal Kitty is WHEAL HARRIETT, lately worked by Messrs. Taylor and Co., who also worked POLBREEN at the west thereof. Polbreen is now in the hands of a London company, who have a very good manager (Capt. John Nancarrow, of Camborne) to conduct the operations. A steam-engine is at work, and, now that tin is high, the mine will soon pay. WEST KITTY (formerly Wheal Rock) is managed by Captain J. Vivian, of Camborne. If the company had stamping-power it is probable the mine would pay well. The operations are at and above the adit level. There is no steam-power on the mine, but I have been informed that an engine will shortly be erected to drain the bottoms. WHEAL FRIENDLY, north of West Kitty, has been worked in like manner; also WHEAL COIT, by Capt. James Evans, of Nance, Illogan, with very little advantage of late. TREVAUNANCE is the property of Mr. J. S. Enys, and has been worked by him and his ancestors for 200 years, with a profit of about 150,000*l*. The whole extent of the mine is about two acres. North of Wheal Friendly and Trevaunance is the celebrated POLBERRO MINE, under the local management of Captain Hancock, who acts for Messrs. Taylor and Sons. The mine is very ancient, and the distribution of the mineral is very peculiar, having no parallel in the county. Miners unaccustomed to the mine would not gain a living out of it at first. The men here may be said to be almost stationary. The ores are those of tin and copper—the latter in but small quantities. Tin at the present price leaves a profit to the company. WEST POLBERRO (formerly Wheal Devonshire) is idle. WHEAL COATES, west of the Beacon, is at work on a small scale, producing tin. There is a patch of decomposed granite in this sett, and there is another at Cligga Head; the remainder of the district is in transition or clay-slate. WEST POLBREEN has been granted by the Duke of Cornwall to the Polbreen Company. Several lodes are backed here, but not much worked. WHEAL FREEDOM is idle. This mine lies east of GREAT WHEAL CHARLOTTE, once very rich, and on the same lodes. NEW WHEAL CHARLOTTE lies South of Great Wheal Charlotte, which it adjoins, and contains four lodes of good promise. A steam pumping-engine and a stamping-engine have been recently erected here, and the tin will soon enable the company to pay their way—so well-informed people have told me. WHEAL TOWAN is idle. The first working, about 100 years ago, was very successful, the ancestor of the late Sir Charles Lemon having received a fortune out of it; but the last working, about 40 years ago, was attended with a loss. Do not try again. TYWARNHAILE has been sufficiently tried, in my opinion. It is idle. EAST TYWARNHAILE is also idle, and there is little done. WHEAL MUSIC contains the celebrated pit called the "Navvy," out of which immense quantities of copper ore were raised, at a large profit, about 40 years ago. WHEAL ELLEN, SOUTH ELLEN, EAST ELLEN, VICTORIA, STENCOOSE, TREGULLOW CONSOLS, NORTH HALLENBEAGLE, SCORRIER CONSOLS, EAST TRESKERBY, EAST DOWNS, WHEAL ROSE, and PRINCE COBURG are all idle—to be further worked in the future. NORTH TRESKERBY is looking well. It will be seen that there are many mines of good promise in St. Agnes, and that better days are in store for the speculators in them. A TRAVELLER.

City, April 12.

BARYTES MINES.

SIR,—I, for one, have viewed the mass, or mountain, of barytes alluded to by your correspondent at the Teign Valley Lead and Barytes Mines, at Bridford, South Devon; and I have also read the company's prospectus, and examined the engineer's plans. I found it a perfect wonder, both in quantity and quality, with every facility for converting it into white sulphate of barytes, worth from 3*l*. to 4*l*. per ton; or, if the company go more spiritedly to work, it may, by the new process, be converted into a much superior article, worth from 8*l*. to 10*l*. per ton. Here is a round margin—a fortune for the shareholders, leaving the lead lodes to follow when fully developed by Barytes capital. I am especially anxious to see the result of this new enterprise. Parties interested in mining should go and see for themselves. Call a cab at the Exeter station, and drive to the roadside inn at Bridford. You will then have a few minutes' walk to the Teign Valley Mines. They are perfectly ventilated, and safe for inspection. After passing some distance through the mass of barytes, you will reach the lead lodes by a cross-cut level to the west, on the course of the Frank Mills Mine. This done, take your samples, and do as I did a few weeks since—send your genuine report to the *Mining Journal*. S. M. R.

North Wales, April 14.

THE COPPER TRADE—HIGH ROYALTIES.

SIR,—The year 1870 has opened with no better prospects for our copper mine—the law of supply and demand govern prices. Our deep mines cannot meet the competition too apparent with mines in new countries, where the percentage of metal is so much greater than we find from the bulk of the ores from our English mines. It is quite clear that after the centre of a large deposit of copper is passed through the quality, or percentage, declines; and as mines get deep so the working charges increase in proportion: for example, look at the returns from the formerly rich mines Wheal Seton, Clifford Amalgamated, and Devon Consols, the percentage of copper from which clearly proves that copper mines cannot be wrought to pay at a much greater depth than about 200 fathoms below the surface, or day level. The future of copper mines in Great Britain can only succeed by the landowner meeting the competition of the age.

Large grants or concessions can be obtained in several countries in Europe, we are informed, at 1-50th royalty or dues, particularly, I believe, in Prussia; and as railroads progress greater competition will be the result, year after year. I have written letter after letter for years past on this subject, which appear to have had little or no effect. Now nearly all the enterprising men have left our shores. This must eventually tell on the value of land in this country. House property in many districts already tell the tale; but the worst is not come. Had not several of the oldest and best copper mines in Cornwall, after yielding millions sterling in copper ores, been found at greater depths profitable as tin mines, a much greater amount of distress and misery must have followed; but this only applies so far to granite districts.

Owing to want of labour, and high rents, 100,000 houses are said to be empty in the metropolis of this country at the present time. Both rents as well as royalties are too high in this country. Gentlemen who get large sums of money out of mines invariably invest a great portion of it again in finding out and opening up new undertakings. I have known many mines shut up, never to be re-opened, owing to the illiberality of the owners of the soil. A. BENNETT.

April 13.

MINING IN FLINTSHIRE—NORTH HENDRE MINE.—No. I.

SIR,—I have observed several letters in the Journal, remarking on this locality, but hitherto the North Hendre Mine has not been named, although it has stood all the storms of the long depression, and at last come off successful. The company was formed about five years ago, and the mine has been from that time to the present carried on by a few influential gentlemen, under all the varying and trying circumstances. The mine is situated about half a mile north of the Great Hendre Mine, which has returned lead ore to the amount of 27,523 tons, and divided a profit of 119,000*l*., the average of this ore being only 10*l*. 11*s*. 6*d*. per ton, which, at the present price of lead, would be at least 13*l*. 10*s*. The North Hendre is worked on parallel lodes, by adit level about 15 yards above the Great Hendre adit level, therefore the present adit level being 90 yards deep it can be worked on all the lodes full 35 yards deeper before coming on the water level, and still 100 yards deeper if the Hendre Mine engines are set to work, which they will be at an early date. Within the last six months operations have been confined to the east and west lode, from which at least 50 tons of ore have been raised, about 20 tons of which have been what is called here round ore—that is, solid lumps—or what is generally called potters' ore, which has realised over 15*l*. per ton. There is now upon the bank about 15 tons preparing for the next sale at Holywell, amongst which there are rocks varying in weight from 1 cwt. to 3 cwts., and I understand the lode in the end is gradually improving. I do not know the position of the company, but I do know that many a mine not half so productive, or with half the prospects to be seen as in this valuable sett, are selling for 30,000*l*. or 40,000*l*., or quoted so. I would, therefore, advise men of capital who are inclined to invest in lead mines to enquire—or better still, to see for themselves—where to invest. I find Mr. John Roberts, Pen-y-Fordd, Mold, is the secretary of the company, and I understand that he has obtained and commenced operations on a valuable piece of land immediately adjoining, and on the same lodes.—*April* 9. ANGUS.

MINE REPORTS—VALUATION OF LODES.

EAST WHEAL LOVELL.

SIR,—Some time ago reports from Capt. Harris frequently appeared in the Journal, declaring the lode in the engine-shaft in this mine to be worth the most extraordinary amount of 1600*l*. per fm., and also in a winze to be worth 90*l*. per fathom. These valuations, especially the former, we thought to be excessive; and, if we were to compare the sales of ore from the mine during the past six months, it does appear that extraordinary deposit must have been of a very short duration, if it ever existed. It appears from the statement of accounts, as presented at the last two meetings, that the monthly sales of tin have hardly exceeded 24½ tons, and if we take the valuations—one at 1600*l*., with tin at 65*l*. per ton, that lode should yield at least 24 tons per fm.; and if we take the other at 90*l*. per fathom, it should be about 1¼ ton per fm.: thus, 2 fms. only sinking in these two places should yield fully 25¾ tons, or over 1 ton per month above the average monthly sales, and not considering any other part of the lode throughout the mine to be worth a single fraction per fathom.

Surely this mine is not dependent on these two places for their returns; if so, can it be possible that with all the science which is being brought to bear on the development of this most extraordinary lode there have been no more than 2 fms. per month extracted from these two places? If so, these reports and valuations may yet be taken, as they were at the time by many, for what they are worth, and, if not, the purser has no cause to boast of low expenditure.

April 14. ANOTHER OBSERVER.

EAST LOVELL—MINE AGENTS, AND "THE MARKET."

SIR,—I am pleased to find that you have opened your columns to the suppression of an increasing evil, which your correspondent "Observer" correctly designates "the growing tendency of mine inspectors to report upon the market price of shares rather than the position and prospects of the mine." While I fully accord with everything that your correspondent has put forth upon this point, and especially with that portion of his statement that their "speculative theories" as to the future market value of a share are almost invariably incorrect, I cannot but think that the evil is immeasurably intensified when, instead of any agent who may be called in to inspect a property, the official agent himself so far ignores his position as to issue an ordinary periodical report, devoting one line only to the vague and, to my mind, unsatisfactory statement "that the mine continues to look very well," and the remainder to a dissertation upon adverse influences brought to bear to depreciate the price of the shares.

I will not now occupy your space by expressing any opinion as to whether these shares are worth their present selling price, simply because the mine is for the time paying good dividends; but I would ask Capt. Quentrall this one plain question—If he considers it part of his duty, as manager of the mine, to animadvert upon the "influences" brought to bear to depress the price, why does he not consider it equally his duty to reprehend those who from time to time bring to bear certain other "influences" to inflate the price far beyond the real worth? If Captain Quentrall is to be the schoolmaster of the mining market it is obviously his duty to do his utmost to check each evil: but would it not be far better, and reflect higher credit not only upon Capt. Quentrall but upon all mine captains if they were to confine their reports to the mines, and leave the market to market men. Each have their especial vocations, and no

sooner does either attempt to trench upon the other than both get out of gear, bringing discredit to themselves and unpleasant consequences to others.

While upon the matter of East Wheal Lovell, I would ask, as a disinterested observer, how it is that on the debit side of the account just issued the monthly mine costs are not charged up later than January, being fully two months in arrear, while, on the other side, the sale of tin made on April 6 (the day before the meeting) is credited?

A DISINTERESTED OBSERVER.

Helston, April 12.

THE VAN MINE, AND ITS NEIGHBOURS.

SIR,—In last week's Journal I see reference is again made to the eastern ground in the Van Consols sett, and which, I think, conveys the idea to parties not knowing the neighbourhood that these is no other ground between the Van sett and Van Consols. Probably your correspondent had forgotten that Pen-y-Clyn sett is next to the Van, on the western boundary, and that the eastern ground of Van Consols is at least 500 fathoms on the line of the Van lode, to the west of the Van sett; therefore, the run of ore ground must go through Pen-y-Clyn sett before it enters the Van Consols eastern ground.

JOHN LEAN.

Pen-y-Clyn Mine, Llanidloes, April 12.

TREVEDDOE MINE.

SIR,—Since the reports have appeared in the *Mining Journal* of the discoveries Captain Rowse is making at this mine, I have received some letters from shareholders, calling my attention to the "mistake," as they appear to think it. I can only say to them we have reported exactly that which we have found, not touching upon what we expect to find very shortly. If they still have doubts, I shall be happy to provide them with orders to inspect the mine, when ocular demonstration may, perhaps, convince them. Meantime, I should advise them not to part with their shares under 3*l.* each.

R. LARCHIN, Sec.

[ADVERTISEMENT.]

VIRTUOUS LADY MINE.

SIR,—As considerable interest has been excited in the expectation that large dividends would be returned on the amount of money subscribed for working this Devonshire El Dorado, it is only natural those concerned should be very anxious to be kept fully informed by Mr. Barnard, the secretary, of all the proceedings at the mine.

Without at all doubting that his promises will be ultimately fully realised, I now ask him for information. What progress is being made towards a sampling of ore? I know that a sanguine man, however truthfully disposed, may be betrayed into the expression of anticipations which it may be found impossible to realise, but I trust Mr. Barnard will not hesitate in publishing in the Journal all the particulars with which he may become acquainted in developing the resources of this acknowledged property. Tardy results will be better than prolonged suspense.—*April 14.*

SHAREHOLDER.

[ADVERTISEMENT.]

VIRTUOUS LADY MINE.

SIR,—Please find a little space for me to inform my friends and the public that my address is now Tamar House, near Tavistock. Particulars of the Virtuous Lady, Brentor, and the Queen Mines will appear in next week's *Mining Journal*, when I will prove to "Observer" that all I state in illustrating passing events is *pure truth*. Sterling, genuine mining properties require no garnish but truth, as I have given—as for predictions, they are steadily coming to pass. I beg to thank the Virtuous Lady shareholders in a body for the numerous kind letters I have received, accompanied by a monthly journal, called "The Investors' and Capitalists' Review," each shareholder having been favoured with a copy. Although the list of the Virtuous Lady shareholders was procured with the special purpose of injuring me, the very reverse has been obtained that was desired, as the mean, paltry act is too palpable. Once again brokers, mining agents, and half-starved Editors, &c., enlisted in the cause to damage one solitary individual, who is doing his utmost to benefit the mining world. I defy the whole seething torrent of you.—*Tamar House, near Tavistock, April 14.*

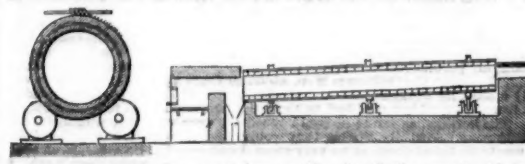
T. J. BARNARD.

A NEW SELF-ACTING CALCINER,

FOR ROASTING TIN AND OTHER ORES AND MINERALS CONTAINING SULPHUR AND OTHER VOLATILE MATTERS.

By ROBERT OXLAND, F.C.S., Metallurgist, Compton Gifford, Plymouth; and JOHN HOCKING, Jun., Engineer, Redruth.

This calciner consists of an iron tube, or cylinder, about 4 feet in diameter and 30 feet long, lined with fire-bricks placed on the edge; leaving an internal diameter of 3 ft. 3 in. It is set at an inclination of from a half to one inch per foot, varying according to the nature of the ores to be treated. On the outside, and fastened to it, are three iron rings, on which the tube travels over three pairs of rollers, by which it is supported. On the side of one of these rings are cogs, by which rotary motion is imparted by suitable machinery. The rate of motion is regulated by pullies of different diameters. The fire passes from the fire-place over a chamber, into and through the tube, and on into flues covered for a short distance with iron plates, on which the dammed ore is dried before it is admitted in a regular steady stream through a tube, into the back or higher end of the calciner. The slow revolving motion of the tube causes the steady advance of the ore by its own gravitation as it undergoes combustion, evolving sulphurous and arsenious acids, so that it is not brought into the sphere of action of the stronger heat until those constituents which cause the tendency to crust have been driven off; and the ore is consequently preserved in fit condition for the completion of the oxidation of its metallic constituents as it is gradually brought nearer the fire. In the interior of the tube are longitudinal projecting ledges, which lift the ore for some distance above the sole of the furnace, and then project it through the passing stream of heated gases. This



constant perpendicular revolving motion is of the greatest importance, as every particle of the ore is kept incessantly in motion, and is thereby brought in contact with the oxygen of the heated gases passing along the tube. The calcined ore is discharged in a continuous stream into the chamber between the fire-place and the front end of the tube. At the back end of the tube "baffle" plates of fire-brick prevent any escape of ore into the flues.

The whole arrangement may be understood by reference to the annexed drawings of a transverse section of the tube and longitudinal section of the whole apparatus.

Great economy of fuel is effected by this furnace in the following particulars. The heat evolved by the combustion of the sulphur and arsenic is made available, so that fuel is employed only for the completion of the operation. The heat from the fuel has to traverse more than double the distance that it has to do in Brunton's calciner before it escapes into the flues, and the tube presents nearly double the amount of heating surface. In the old burning-house oven and in Brunton's calciner the crown of the furnace is much more highly heated than the sole, and great loss of heat is the consequence; but in this furnace the heat absorbed by the crown is most advantageously applied by its being rendered in succession the sole of the furnace. As it passes down and under the charge the excess of heat is given off to the charge, and absorbed by it.

In the case of the treatment of arsenical ores in the furnace, the evolution of the arsenious acid at a minimum temperature is a matter of great importance, as the rapid and effectual condensation of it in the flues is greatly facilitated.

The labour required is limited entirely to the maintenance of the fire, the supply of the raw material, and the removal of the calcined product.

The great advantages of this furnace consist in its simplicity of construction, and consequent low prime cost; in its durability and small expense for maintenance; in its efficiency and rapidity of action; in its economy of fuel and labour; and in its non-liability to deragement, from the fact that none of the working parts are exposed to the action of the fire.

ANNEALING METALS.—According to the invention of Mr. J. M. BOTTUM, of Southampton-buildings, an annealing pot of any common or suitable form is employed, within which the metal to be annealed may be packed in charcoal or other material, and the whole introduced into the furnace for heating in the customary manner. When the heating is completed the pot is removed from the furnace and placed in the improved cooling chamber, which is then closed air-tight until the gradual cooling of the metal within the annealing pot is finished. The annealing pot during this process is preferably supported at a considerable distance from the external walls of the chamber, and the cooling chamber itself is preferably supported in such a manner as to lessen or avoid any unequal conduction of heat from its various parts.

MANUFACTURE OF WHITE LEAD.—Mr. W. R. LAKE, of Southampton-buildings, for a correspondent, proposes that the ordinary galena shall be treated in an ore-crusher. It is then roasted in an ordinary desulphurising kiln or oven, and then mixed with carbon, preferably in the state of fine washed pea or dust anthracite coal, in the proportion of half and half. He then heats the mixture in a compound reducing and oxidising furnace, and dense white fumes or vapours pass off. These are conveyed into a separate chamber or receptacle, where the vapours are strained by passing through bags or screens of muslin or other fabric, or are allowed to deposit by being passed slowly through an extended chamber, in the way in which lampblack, oxide of zinc, &c., have been heretofore collected.

IMPROVEMENTS IN THE SEPARATION OF COPPER.

Mr. PETER SPENCE, of Newton Heath, Manchester, has patented an invention which relates to the separation of copper from ores by the "wet process," and in obtaining it as a sulphide, to be subsequently reduced to the metallic state by any known process. To effect this he proposes to use sulphide of ammonium or sulphuretted hydrogen, obtained by certain means. In carrying out the invention, Mr. Spence takes the solution as now obtained in extracting copper from ores by the wet process, which solution is a chloride of copper, containing iron in variable proportions, and generally containing free hydrochloric acid. He places this liquor in large open vats, and in another vessel of cast-iron, fitted with a revolving stirrer, places a considerable quantity (say until it is one-third full) of the vat waste of the alkali manufacture, which waste he prefers to be in a fresh condition; or he uses the same quantity of the spent lime from the gas purifiers, and to this adds a solution (containing, say, one-fourth the weight of the vat waste or spent lime) of sulphate of ammonia or chloride of ammonium. The vessel being closed, he blows into the solution and material a jet of steam (say) from 20 lbs. to 30 lbs. pressure. A pipe leading from the said vessel or still is carried into the vat containing the solution of copper and iron. Sulphate of ammonium distils over into the metallic solution, sulphide of copper is precipitated, and the ammonia combines with the liberated hydrochloric acid. The process is continued until all the copper is thrown down, which point is at once observed by sulphuretted hydrogen being evolved, and the process is stopped, for if continued the ammonia would now neutralise the free acid, and the iron would then be precipitated. The sulphide of copper is now allowed to settle, and the supernatant liquor being drawn off water is added to wash out the acid solution of chloride of ammonium and iron, which is used with a new charge of vat waste or spent lime in the still, and so the process is carried on continuously with the same ammonia; but as there is a small loss of ammonia, from its being impracticable to completely distil off every charge, and also from imperfect washing of the sulphide of copper, a quantity of ammoniacal water of gas works may be used in the still to make up the deficiency. The sulphide of copper, nearly pure, or with a mere trace of sulphide of iron, is dried and smelted into copper by any of the usual methods employed, or it may to a a large extent be converted into sulphate of copper by being heated nearly to redness in a furnace and then dissolved in water. The insoluble portion left may be smelted, as before mentioned. In carrying out the invention Mr. Spence, by another method, adds gradually to the alkali waste or spent gas lime in a close vessel hydrochloric acid, passing the sulphuretted hydrogen obtaind thereby into vats or vessels containing the metallic solution, and sulphide of copper is precipitated. He continues this operation until all is thrown down, and the residual liquor being now strongly acid is used for the next charge, being again added gradually to the spent lime or alkali waste, and ordinary hydrochloric acid is used to supply the deficiency. The sulphide or copper is in this case also nearly pure, and may be smelted into copper, as before mentioned.

TREATING PYRITES, TO OBTAIN SILVER AND LEAD.

Mr. WM. WRIGHT, of Mostyn, has patented an invention, which has for its object the recovery of the lead and silver contained in burnt cupreous pyrites. For this purpose he first extracts the copper by roasting, either with or without salt, and subsequent lixiviation. Both these methods for obtaining copper from such ore are well understood. When salt is used for the extraction of the copper the greater part of the lead remains behind in the iron residues or "purple ores" (that is to say, in the ores from which the copper has been dissolved) in the state of sulphate, together with a little silver, whilst the largest portion of the silver is dissolved out with the copper, together with a little lead, and is precipitated along with the copper by means of iron. When the extraction is conducted without salt—that is, by converting the copper into soluble sulphate by roasting the burnt cupreous pyrites in the furnace without salt, or when hydrochloric acid is added in lieu of salt before the ore goes into the furnace, and when by subsequent lixiviation the copper is dissolved out—practically all the lead and silver remains in the iron residues. In either case Mr. Wright operates:—

"I wash the iron residues, or 'purple ore,' with a strong solution of salt (brine), either hot or cold, which readily dissolves the sulphate of lead and the silver. The lead and silver are precipitated from the brine by any of the well-known means. I prefer using for this purpose a solution of sulphide of sodium, or milk of lime, taking care not to add an excess, so as to be able to use the brine over and over again after being re-saturated with salt, until it gets too foul. When in addition to the lead and silver the brine washes out copper, which is generally the case, this metal is precipitated with some of the silver by scrap iron, previous to the addition of sulphide of sodium or milk of lime, which then throws down the lead and a little iron. After this treatment I find the 'purple ore,' or oxide of iron, is not only free from lead and silver, but generally much improved in quality, and consequently in a condition better suited for the purpose of iron making. I claim the extraction of lead and silver from the iron residues or 'purple ore' obtained in the treatment of burnt cupreous pyrites by means of brine, substantially as above described. I also claim the purification of the iron residues or 'purple ore' by means of brine, substantially as above described.—2. To obtain the silver and lead contained in the copper precipitate it is first converted into black oxide of copper, by treating it in a reverberatory furnace at a very low temperature, so as to avoid as much as possible any volatilization of the metals, and with the same object a little lime is added. Subsequently or shortly before the removal of the charge from the furnace a small quantity of common salt is added, either alone or mixed with sulphate of iron, in order to ensure the complete transformation of the silver into chloride. I now wash with brine and precipitate the silver and lead, as before described."

Mr. Wright claims, as respects this part of his invention, the extraction of silver and lead from the copper precipitate obtained by the treatment of burnt cupreous pyrites, by oxidising such precipitated copper, and further treating it and dissolving out the silver and lead with brine, substantially as above described.

TREATING CONGLOMERATES OF CAST-IRON, &c.—Messrs. T. S. BLAIR, of Pittsburg, and F. ELLERSHAUSEN, of Nova Scotia, state their invention to consist in re-melting such conglomerates in a cupola furnace or any other suitable re-melting furnace, and in using the material thus produced for the manufacture of cast-steel, either by the Bessemer process or any other known process for the production of cast-steel. By this process of re-melting the conglomerates the impurities, such as phosphorus and sulphur, are wholly or partially removed, and therefore the refined metal is rendered suitable for conversion into cast-steel.

SAFETY-CAGES FOR MINES.—In constructing a safety-cage according to the invention of Mr. C. R. STOOKE, of Teignmouth, the cage is divided into three compartments. In the middle is the platform on which the men to be raised or lowered in the mine shaft stand, in the top is a funnel-shaped mouth, which forms the top of the cage, and also a roof to the men's platform. From the funnel-shaped mouth, and passing through the men's platform, is a tube, through which the winding chain or rope by which the cage is raised or lowered passes. The principal novelty in this invention consists in applying to the bottom of the cage a series of four arms or levers, connected together at their inner ends by a cross rod or axis, against which rod or axis a weight on the end of the winding chain bears. When strain is put on the chain or rope to raise or lower the cage the inner ends of the levers are raised, and the outer ends are drawn within the cage, and offer no obstruction to the motion of the cage. Should, however, the chain or rope break, the levers fall or are pressed down by weights. Their outer ends are thereby projected from the angles of the cage, and engaging with stops, projections, or rounds on uprights in the mine shaft, support the cage in the mine shaft. Other levels or breaks may be situated in the middle part of the cage, which can be operated by the persons in the cage, so as to prevent the cage being raised above its proper height.

SAFETY-LAMP.—The invention of Messrs. HYDE, West Bromwich consists in the use or employment of lead or other fusible material for a link in the construction of a lamp, such link being used as a communication between the pin on the upper end of the shield and the releasing-rod, which is in connection with the bridle, or cross-bar, which carries the gridiron, valve, or shutters, so that when fire-damp enters the gauze in a sufficient quantity for combustion to take place the heat generated by such combustion shall have the effect of making rotten or melting the said lead or other fusible material employed for such link, and thus cause the alarum, or alarums, in connection with the apparatus to give warning that fire-damp is present, and simultaneously, by the falling of the valves, extinguish the lamp, and thus effectually prevent the ignition of fire-damp outside the gauze.

FOREIGN MINES.

ALMADA AND TIRITO.—The vendors of the Tirito Mines, forming part of the mines recently sold to the Almada and Tirito Consolidated Silver Mining Company, have advices from Bremen of the result of the reduction of 75 bags of Pitanque metal, raised from the Tirito Mines, and forming part of the undermentioned ores:—Gross weight delivered in Hamburg, 28,044 lbs.; 48 bags sent to Freiberg, 13,169 lbs. gross (12,466 lbs. net, dry); 100 bags sent to Clausthal, 14,875 lbs. (14,330 lbs. net, dry); total, 26,796 lbs., equal to 12 tons. Net proceeds, after paying freight from Mazatlan to Hamburg, and all other charges, 1346*l.* 2s. 5d., or 112*l.* sterling net per ton. This includes the gold, silver, and copper contained in the ore, or 100*l.* sterling net per ton—the product alone of silver contained in the ore.—The directors of the Almada and Tirito Mining Company have advices from their chief engineer, Mr. John P. Clemes, that he arrived off Cape St. Lucas, on the Pacific Coast, on March 10. He will, probably, have reached the company's mines about March 17.

CHONTALES (Gold and Silver).—The directors have advices from Mr. Belt, dated March 8. Remittance of gold, 254 ozs.; cost for the month, 670*l.* Mr. Belt states the mines are being vigorously developed, and considerable improvements have taken place in the San Antonio and Trinidad Mines. In the No. 5 level, at San Antonio, the lode is 3 ft. wide, worth 15 dwts. per ton; and in the Trinidad Mine the lode is 4 ft. wide, at present worth 10 dwts., and in some parts has been worth 1 oz. per ton. Mr. Belt adds that this level is 11 fms. deeper than the deep level at San Antonio, and is the first discovery made of rich ore at so great a depth, leaving 20 fms. of backs above the end, which have not been touched. The development at San Benito is also very encouraging. The health of thn establisment is good.

— W. Evans, Feb.: Trinidad and West San Benito: During this month the Trinidad level has been driven 10 varas; the first 4 varas the lode was hard and difficult for driving; however, for the last 6 varas the end has been much easier for driving, also carrying a small rich nail on the south part of the lode. The nail appears to be opening out very much in the back, it being from 10 to 12 in. wide; the lode altogether is 4 ft. wide, and worth 1 oz. of gold per ton. We shall commence to rise in the back of this level in a few days, and open out stopes as soon as possible. We sent to mill 56 tons, yielding 10 dwts of gold per ton. The rise at West San Benito has been put up 24 varas; lode from 4 to 5 ft. wide, yielding from 2 to 3 dwts. of gold per ton.

— J. Tonkin, Feb.: San Antonio Mine: No. 1 stope, in the back of the No. 5 level, east of Piper's shaft, has been stoped 51¼ varas; lode 3 ft. wide, worth 6 dwts. of gold per ton. No. 2 stope, in the back of the same level, east of Piper's shaft, has been stoped 36½ varas; lode 4 ft. wide, worth 5 dwts. of gold per ton. No. 3 stope, in the back of the same level, west of Piper's shaft, has been stoped 10 varas; lode 3½ ft. wide, worth 7 dwts. of gold per ton. No. 1 stope, in the back of the deep adit level, has been stoped 51 varas; lode 3 ft. wide, worth 4 dwts. of gold per ton. No. 5 level, west of Piper's shaft, has been driven on the course of the lode 24 varas; lode about 3 ft. wide, worth 18 dwts. of gold per ton. No. 5 level, east of Piper's shaft, has been driven on the course of the lode 20¾ varas; lode 4 ft. wide, worth 3 dwts. of gold per ton. The total cost of the San Antonio Mine for the past month amounts to $1338·37, which includes $56 for alteration of incline plane. During the month we have sent to stamps 826 tons of ore, at a cost of $1·62 per ton, which I estimate at 5½ dwts. of gold to the ton.

EXCHEQUER (Gold and Silver).—Capt. Chalmers, March 14: I have the honour to report that on Saturday the winze was down 37 ft., and all timbered. The ore-bearing part of the ledge appears to be from 2 ft. to 3 ft. wide. The air shaft is now up 42 ft.; at 37 ft. we struck water, which "slackened up" the hanging wall on the east side, and somewhat impeded operations, but we have now got above the water, and will make good running next week. We have had considerable difficulty in getting the timber to the mines, the heavy fall of snow making it impossible for horses to haul it; there was no alternative, therefore, but to put four men to do that work; 350 ft. have been got in, enough to last nearly two months, at a cost of 5 cents. per foot. There is about 3 feet of snow here, and no appearance of settled weather. I had a letter from the secretary of the mill at Reno, stating that our ore should be "run" first. I was able to send 2½ tons only, the teamster refusing to take more, in consequence of the state of the roads.

— Extracted from the *Alpine Miner* of March 5:—"Big Nugget: The foreman of the Exchequer Mine, Mr. George Lowe, informed us this week that they had lately found several fine masses of ruby ore in the new shaft of that mine; one of these, weighing 72 lbs., was a beauty to look upon.—Better than Represented: While the sale of the Buckeye Mine to the Exchequer Company was being made in London no ore was obtained which assayed over $500 per ton, but since the Exchequer commenced work large masses of better ore are being taken out. We hear of several assays of late which go over $1400 per ton.—Stetefeldt: Just now the Stetefeldt furnace is attracting more attention than any other style of works in Alpine. The Exchequer Company has this week sent out 3 tons of ore, assaying from $100 to $1200 per ton, to be worked at Reno by this furnace; and the Messrs. Chalmers will go out and see it through the entire process, thereby thoroughly testing the same for our ores. Several other lots await the result."

SWEETLAND CREEK (Gold).—A telegram announces that the profit for 21 days clean up to Monday last was $6000. This is apart from the workings of the Creek portion of the undertaking, which had not at the time of despatch been completed.

BRAGANZA (Gold).—By the steamer "Tycho Brahe," just arrived at Liverpool, intelligence has been received confirming the telegram to hand on Monday, to the effect that another lode has been cut, 4 feet wide, yield 4 ozs. to the ton. Mr. Richards states, on Feb. 18, that another lode was discovered, from which they have extracted the most encouraging samples of gold, yielding 80 dwts., or 4 ozs. per ton. This new lode is about 4 feet wide, as now seen. The stone can be broken at a trifling expense, as in all probability four men can break 1 fathom in 24 hours, and this would yield at least 6 tons of ore. The stone in the lode previously reported as cut on Jan. 10, is still very good, and the whole body will render splendid results in the stamping mills.

ANGLO-ITALIAN.—The report for March states that there is no material change to notice in the mines since last month. The reduction machinery has commenced working. They are already in a more regular way of working, continuing night and day. The machines at work separate the gold well. The Cavetta ore now treating shows pretty well on the blankets and in the batea. The stamps pulverise of it about 10 tons per 24 hours, so far as can be judged at present. This is the hardest of the ore, consisting to a great extent of granite gangue. After the end of the present month it is hoped they will be able to send a remittance.

ANGLO-ARGENTINE.—The directors have advices from Mr. Barnard, the company's superintendent, from Buenos Ayres, dated March 3, informing them that he has received from the Argentine Government the cost of the road from San Juan to the mines, amounting to $5579·17 (1160*l.* 9s. 4d.) and that he has also procured the exemption from duty of the whole of the machinery, &c., ex Crusader.

CAPE COPPER.—The directors have received despatches per Norseman to Feb. 25: The general reports will, as usual, be sent by next mail. Bills of lading are received for 386 tons per Glanrafon. The Lynwood and Clarissa have arrived with 675 tons together; 130 tons of ore have been sold by private contract, at 13s. 1½d. per unit.

CAPULA (Silver).—The directors have despatches from the superintendent, dated Pachuca, March 7, from which the following is an extract:—The ground in the bottom cross-cut (San Pablo) is still very hard; last week we met with a branch of quartz, with good spots of ore, and letting out a great deal of water, so we consider the lode is close at hand, and there is not a doubt but we shall intersect it this month. The water has sunk but very little as yet in the winzes. San Onofre winze, below San Enrique, is only 10 varas east of the cross-cut, yet the water is sinking but very little, owing, no doubt, to the hardness and closeness of the ground. The lode in San Enrique end is very promising, producing metal of rather low ley—9 marks per monton, which, no doubt, will improve in depth. San Enrique winze has been suspended for some time on account of the water. In this winze the lode has a very promising appearance, and produces metal of very good quality, and as soon as the water is gone we shall resume the sinking; this winze will be very serviceable for ventilating the new level we shall drive east from San Pablo cross-cut. The ground in the Esperanza end is exceedingly hard; the lode has a kindly appearance, but at present is unproductive; we shall soon get under the old extensive workings of La Ciguena. San Jorge rise is suspended for the present, and we have put the men to commence another stope west. The stopes west of rise continue to produce metal of good quality, but to the east the ground is very hard, and the ore narrow. The net proceeds from the silver, 371 marcs 2 ozs., sent to Mexico on the 23d ult. amounted to $3311·72.

PESTARENA UNITED (Gold).—Thomas Roberts, James Mitchell, Thomas Warne, April 4: We treated in March month by the small mills at Pestarena 100 tons of ore, which yielded 88 ozs. 18 dwts. 14 grs. of gold; and 185 tons of ore from Pestarena, treated at Battigio establishment, yielded 142 ozs. 7 dwts. 9 grains. From Val Toppa Mine we treated 488 tons, which gave 349 ozs. 6 dwts. 11 grains., making a total of 580 ozs. 12 dwts. 10 grains. This gold we consigned in seven ingots to Signor C. Menozzi.—Mines: Peschiera: We continue to haul away the rock and inferior ore broken in widening the 46 with the whim. In doing this work we are at the same time laying a tramroad in this level; and we hope during this month to get ready to receive ore coming from the levels under the 46 fm. level. The stopes in bottom of the 70 yield 10 tons of ore per fathom, worth 1 oz. 10 dwts. of gold per ton. The stopes in bottom of the 75 fm. level yield 4 tons per fathom; worth 1 oz. per ton. The stopes in bottom of the 46 fm. level yield 4½ tons per fathom, worth 18 dwts. per ton; and the stopes in back 5 tons per fathom, worth 7 dwts. per ton. At this level we are driving south on a side lode; the end yields 2 tons per fathom, worth 12 dwts. per ton. The stopes in bottom of the 33, on No. 5 lode, yield 4 tons per fathom, worth 17 dwts. per ton. The end driving north on No. 4 lode yields 2 tons per fathom, worth 8 dwts. per ton. We have commenced to drive south at the 33 fathom level; this end yields 6 tons per fathom and is worth 8 dwts. per ton. The end driving south at the 16 fathom level yields 7 tons per fathom, and is worth 12 dwts. per ton; and the stopes in the back of this level yield 8 tons per fathom, worth 15 dwts. per ton. The stope in bottom of adit, near boundary, yields 4 tons per fathom; worth 17 dwts. per ton.—Aquavite Mine: The end driving south in the adit on No. 1 lode yields 5 tons per fathom, worth 12 dwts. per ton. The end driving south in this level, on No. 2 lode, yields 2 tons per fathom, worth 9 dwts. per ton. The end north in the 23 yields 4 tons per fathom, worth 12 dwts. per ton; and the stopes in the bottom 5 tons per fathom, worth 17 dwts. per ton. We shall commence a new stope in the back of this level this month. The 23 fm. level end south yields 3 tons per fathom, worth 15 dwts. per ton; and the stopes in back of this level yield 3 tons, worth 15 dwts. per ton. During this month we shall commence a new stope in bottom of this level, where the lode will yield 5 tons per fathom; worth 1¼ oz. per ton. The stope in bottom, south of whim-shaft, yields 4½ tons per fathom, worth 1 oz. 10 dwts. per ton. The winze in bottom of the 33 fm. level yields 5 tons per fathom, worth 15 dwts. per ton. The end of the 33 fm. level south yields 3 tons per fathom, worth 15 dwts. per ton; and the stope in back of this level yields 7 tons per fathom, worth 1 oz. per ton. The end of the 46 south yields 5 tons per fathom, worth 7 dwts. per ton; and the stopes in bottom 6 tons per fm., worth 1 oz. 5 dwts. per ton. During the past month we have widened the 46, south from Aequavite engine-shaft; and in the present month

we intend placing a wire-rope from the engine-shaft to work a pump in the bottom under the 46 fm. level; this bottom is now down for a 55 fm. level. In this way we facilitate the opening up of a 55 fm. level.—Val Toppa: We have resumed driving the end south in Marmo Rossa level, which will be known in future as No. 1 level. The lode in this end is 3 ft. wide, worth 7 dwts. per ton, The end driving north in this level is yielding some low-class ore. No. 2 level, in the end driving south on the new or flat lode, is yielding 3 tons of ore per fm., worth 12 dwts. per ton. The end driving north at this level yields 3 tons of ore per fathom, worth 7 dwts. per ton. No. 1 stopes, in back of this level, yield 12 tons per fathom, worth 1 oz. per ton; and No. 2 stopes yield 10 tons per fathom, worth 10 dwts. per ton. No. 3 stope yields 4 tons, worth 10 dwts. per ton. In the new cross-cut east at this level we have just reached another lode, and shall be able to say more about it in our next.—No. 3 Level: The end driving south, on the flat lode, yields 5 tons per fathom, worth 7 dwts. per ton. The stope in back of this level yields 9 tons per fathom, worth 1 oz. per ton. The rise about this stope yields 7 tons per fathom, at 15 dwts. per ton. No change in the cross-cut east and west at this level.—No. 4 Level: In the cross-cut east we have reached a fissure letting out plenty of water, and are draining the water from the winze that we had to suspend on the side lode at No. 3 level. We hope shortly to be able to resume sinking the said winze. No change in the cross-cut west at No. 5 level.—Surface: We have a great force of hands building walls for shoot and roads leading to the wire-rope terminus, and at the establishment we have also a great many hands—viz., carpenters and masons—making preparations to receive the ore from the wire tramway, and erecting a stamp and jigging machine to concentrate the low-class ore. At Pestarena the water in the Anza is gradually increasing, but not as yet sufficient to drive all the mills; however, we hope shortly to get the whole of the mills going; at present there are 170 running. During the past month we turned an arch over the new water leat, about 40 metres in length; a considerable length remains yet to be covered. We have yet 2 ft. of snow at this mine. Our carpenters are engaged principally in getting out work for new pump gear and for tramroads.

PANULCILLO (Copper).—Mr. Lambert, March 3: says—When I last wrote you I was fully taken up with the erection, &c., of my trial furnace, since then I have had same at work, and find that it fully comes up to my expectations. I purpose, in the course of this month, commencing the erection of a sufficient number of furnaces for working all the produce of your mines, only awaiting the arrival of the "Scout" with my machinery.

VAL ANTIGORIA (Gold).—Thos. Roberts, April 4: Since our last we have started the new whim in the adit level at No. 2 Mine; this machine is fixed 27 fms. below the level top of main shaft, and 120 fms. south of same, and is driven by means of wire-ropes, attached to the winding-machine near the main shaft at No. 1 Mine. We are pleased to say it hoists the wagon through the incline shaft very well. We are now engaged in hoisting off a great quantity of stuff lying in the 20 fm. level, and are in a much better position for hoisting from No. 2 Mine than ever we were before, and with a saving of cost. We melted the gold obtained in March on the 2d. of this month, and consigned it to Signor C. Menozzi: one ingot weighing 9 ozs. 18 dwts. 2 grains, obtained from 10 tons of ore. No. 1 stope in back of the 20, on No. 1 lode, yields 1½ ton of ore per fathom. No. 1 stope, in back of the 30, yields 1 ton; and No. 2 stope, 2 tons per fathom.

WEST CANADA.—F. Williams, March 15: Huron Copper Bay: The lode in Stephens's winze, sinking below the 35, west of Palmer's shaft, looks well; it yields 2½ tons of ore per fathom for the length of the winze. The stope below the 20, east of Stephens's winze, is worth 2¼ tons of ore per fathom. The stope in the bottom of the 20, west of Palmer's shaft, yields 3 tons of ore per fathom. The stope in the bottom of the 20, west of Powell's winze, on Fire lode, yields 2¼ tons of ore per fathom. The stope over the 35, east of Bray's engine-shaft, now yields 3 tons of ore per fathom. The stope in the bottom of the 35, east of this shaft, and east of Bartle's winze, is a little improved since last report; it now yields over 2½ tons per fathom. The stope over the 35, east of shaft, yields 2 tons. In the 50, west of Palmer's, the lode still looks well; the orey part of it is about 12 ft. wide, and yields fully 3½ tons of ore per fathom. In the cross-cut in the 60, south of Palmer's, we have cut what we suppose to be a continuation of the lode in the 50, but we are not in far enough to speak of its value with certainty; we hope, however, it will prove equally as productive as the 50. Bartle's winze, sinking below the 50, east of Bray's shaft, still yields 2 tons per fathom.—Wellington Mines: The stope east of Rowe's shaft yields fully 3 tons of ore per fathom, and the stope west 2 tons per fathom.

The Royal School of Mines, Jermyn Street.

MR. WARINGTON SMYTH'S LECTURES.

[FROM NOTES BY OUR OWN REPORTER.]

LECTURE XXXVI.—In the previous lecture (said Mr. SMYTH) I described to you the mode in which the orey ground in a lode was gradually worked away between the levels and the winzes, and the points of difference between overhand and underhand stoping; and pointed out that while in some respects the one was better than the other—as, for instance, in the relative consumption of timber—it might be necessary when a particular kind of jointiness runs through the ground, or from its extreme hardness and the size of the opening to be left, to employ the one rather than the other. Indeed, those two methods are employed in all the mines of the world where the work is carried on with any degree of speed and spirit, as the best that can be devised for bringing a large number of men to bear on the work at once. In overhand stoping I mentioned that certain "passes," or openings, about 2½ ft. in diameter, were left to throw the material through. These passages frequently are fitted at the bottom with a sort of penstock, which retains the material, and allows it to accumulate until the wagons to convey it to the winding shaft can be brought. They are then run in beneath, the penstock is opened, and a load of the material let down, when the supply is intercepted until the full wagon is drawn out, and an empty one run under in its place, and the process is repeated. This is an excellent arrangement, and saves much time and labour. It is better still when the good material only is so treated, and the attle kept for the men to stand on when doing their work. A similar method to overhand stoping is that adopted in the North of England, where they are called headings, and where in the mountain limestone certain bands intervene between those which it is desired to obtain. There is a difficulty sometimes in introducing this system where it is the custom or fashion of the country to work in a particular way; and so in the South of Europe, and in Spain and Portugal, it is difficult to get the men to take kindly to overhand stoping. When the deposits are of an irregular character, as, for instance, in the case of pipe veins or flat veins, which give no regular room to work them away, it is noteworthy, however, that they put in stopes wherever it can be done, although they do not adopt the overhand system. It very rarely occurs that any very extensive piece of ground can be taken away bodily; but when that does happen it has to be dealt with by what is called arching, and which acts so as to prevent the workings from collapsing. In some cases really good orey ground even has to be left as an arch for the sake of securing the rest. This is always proper to be done to protect the great thoroughfare of the mine; and there ought always to be a strong arch or mass of ground left adjoining the shaft, as nothing can be more dangerous than to omit the latter precaution.

There are cases in which lodes of moderate size are difficult to work, as, for instance, I might mention the East Wheal Rose, except upon the principle of taking out a very small quantity at once. On the other hand, there are large lodes which are so strong as to allow of their being stoped away without any special precautions. This is the case at Devon Great Consols, at some of the mines in the west of Ireland, and at the Berehaven Mine, where the walls are 40 feet or 50 feet apart, and exceedingly strong, and where I have seen them stand open when the copper ore has been stoped away to a great length. As a rule, however, when we come to lodes which exceed 20 ft., and if the ground above is of a yielding character, the excavations must be made with the greatest caution. Ores of this kind were worked years ago in the county of Wicklow, in chambers, leaving a piece or arch between the portions worked. There will, no doubt, come a time when these arches containing ore will be wanted, and if in the chambers from which the ore has been taken the space be filled with attle, the operation may be safely carried out, but otherwise there must be a collapse, a sort of thing which is most dangerous if allowed in the upper part of a mine. In the case of a lode of very large size, other methods have to be adopted, as, for instance, in the large wide workings of tin which occur in Cornwall, where the lode is contained in granitic material, but with a series of strings, 3 or 4 in. wide, leaving a large amount of refuse to be laid aside, and thrown down to help the arching.

It is, however, almost impossible to provide always against accident, and it is, therefore, necessary to adopt the best possible methods of laying out the workings, and to have plenty of timber to support the roof, placing the attle so as to follow closely the operations of the men overhead, and leaving as little open space as possible. If it be the nature of the ground or mineral to oxidise, and give way to the action of water or air, the destruction of the rock may be exceedingly rapid, and in that respect I know of nothing more remarkable than what has happened in some of the Ulverstone hematite workings. When the openings are first made the walls are tolerably hard, but with their peculiar structure, and their susceptibility to the action of air, and damp, and pressure, the same rock which would defy the blow of a heavy pick will fall asunder almost at a touch, and, therefore, it will not do to trust only to a few feet of thickness in the pillars and arches. [Mr. Smyth here exhibited a model, showing the modes of arching in ground of this sort.] It will very frequently happen that the best plan to adopt is that of transverse or cross work, by which considerable widths may be obtained with comparative safety. This is done in some of the rich mines in Bavaria, at the Benares Mine, in Spain, and at the Beckwith Mine, in the Isle of Man, where the lode is from 30 to 40 ft. wide. In the latter case the quantity of timber used is enormous. The same system of working is in use in the Ulverstone district [of which a model was exhibited]. The shaft is sunk in the limestone, and cross-cuts are made for 20 or 30 yards through sand and silt, and clay and other detritus, in which the deposit of hematite is found. Cross-cutting is one of the methods most frequently employed for the purpose of enabling the miners with safety and with certainty to extract a sufficiently large quantity of orey material from veins which, being larger than usual, and made up of softer material, may offer special difficulties. There is one point further in respect to these operations which, as compared with stratified workings, remains to be noticed; and that is when certain limited portions of the mass to be worked are arranged according to any of the plans I have mentioned and removed, it will be necessary to fill up the openings so made with refuse material, either obtained in the workings themselves, on the spot, or at a distance, or even from the surface, before other parts should be attempted to be worked out. In England this is the case in the mine I have already mentioned in the Isle of Man, and in other well-conducted mines; but if we were to go into Cornwall, or the South of Ireland, as, for instance, the workings of copper ore near Waterford, we should find many cases in which propping has utterly failed, and where the employment of attle would probably have been successful. Indeed, in such cases as those I allude to no method of propping would be equal to introducing attle into the spaces from which the mineral has been removed. When large open spaces are made they must be filled in by some means, or there is every probability that a shifting of the beds will take place, which may result in the total destruction of the shafts and workings, and the loss of all that may be left below of valuable material. It has, therefore, often been found worth while to throw refuse from the surface down the shaft, and employ it to fill up openings below. Nay, it has even been found worth while to sink a special shaft when the ground is not of a very expensive character for this purpose, but the best plan is, if possible, to get the attle in the mine itself. It may appear very difficult in some cases of very large lodes to accomplish this method of filling in; but it is obvious that when the openings exceed 20 or 30 ft. in width any system of propping must be very expensive indeed, and will always be insecure. There are many cases on record in which terrible catastrophes have taken place from causes of this kind, amongst which one of the most noted is that of a mine in the eastern part of Hungary, called Felsöbanza, where large openings having been made by fire-setting, tremendous wide spread ru in has followed. Another remarkable instance may be quoted in Brazil, at the St. John del Rey Gold Mine, which has placed for the present those magnificent workings in abeyance. The space being 60 ft. from wall to wall, they had gone downwards, constantly stoping away the ground till at a depth of 160 fms. the opening was so vast that it could not be otherwise than dangerous. The shaft was protected by timber, and stull pieces put across. These were composed of the largest beams that could be obtained in the district, strongly fastened together, and made into enormous compound beams, reaching from wall to wall. Where the space was so vast it might reasonably be prognosticated that even beams of such a size and strength as those employed could not hold out. However, they did hold out for a long time, and might have done so much longer, but, unfortunately, a fire took place in the workings, some of the stull pieces were burnt, the others began to break, masses of material came thundering in from the sides of the lode, human life was no longer safe, the men were withdrawn, and the workings for fathoms and fathoms were all destroyed. The only way it is now stated of getting at the lode again is to sink a shaft at a considerable distance from the old workings, and reach it by cross-cutting, a work which will cost a large sum, and occupy a great deal of time.

With a view to these great risks, what is called the transverse system is largely used in Hungary in the wider portions of the veins; and there is a mine most remarkable for this kind of work in the south-west part of Spain—the quicksilver mine at Almaden. Of course, the style of work will always be influenced by the value of the deposit obtained. The value of the cinnabar with which the quicksilver is associated is high, and thus the proprietors can afford to adopt the best system without much regard to expense. The lode, which has to be worked to a considerable depth, has a breadth of from 24 to 30 ft., and the mode of working is to make a sump or winze (A), 4 yards in width, through the whole mass to be got between two levels; then 4 yards are left, and then another winze (B) is sunk, and another space of 4 yards worked out, thus leaving a solid block between the two openings. In winze A a good strong arch is put up, and on it is built a mass of dry walling, with now and then an arch run across. Winze B is also filled up in the same way, and then the intermediate mass of orey material is worked out, and the space left vacant. This is an expensive method, but it is one which is conducive to the durability of the mine, and permits the work to be carried out with perfect security. In dealing with these large widths it is immaterial whether the work is carried downward from the surface, or upward from the depth; there must always be great anxiety as to supporting the ground perfectly, and, therefore, when a sufficiency of natural buttresses cannot be left artificial ones must be put in. The same necessity exists when the works are open to the day, and it is only a few weeks ago that a most terrific fall took place at a quarry in North Wales, where, for want of precautionary measures, a mass, estimated at 500,000 tons, came down and filled the whole quarry, to the suspension of all profitable work for a length of time. And when we remember that these wall masses are so large as to make it necessary to break them up with gunpowder, we shall see that no care is too much to prevent accidents of this kind.

LECTURE XXXVII.—I now pass to the working of stratified deposits, exclusive of those beds which are tilted up, and have such an angle of inclination as to look like regular lodes, and to require working in a similar manner. The great majority of stratified deposits are nearly horizontal, or are only moderately inclined, and in dealing with them it is of great importance that we should be acquainted with the different methods which have been proposed from time to time, or carried out; for where there are several different modes of working it must necessarily follow that they cannot all be the best, but all may have individual excellencies which may be usefully adopted. Some methods doubtless are better suited for one district than another, and a good deal depends upon a right choice being made. I have already mentioned, in speaking of the various conditions of mineral veins and their working, something of the caution and consideration which should guide us more or less in the application of the different kinds of working underground. And in dealing with materials for which there is a very large sale, such as coal or iron ore, of which the "get" must be large and rapid, there are a few special requirements and conditions to be looked to, which differ from those affecting metallic veins. We must be careful in laying out workings in stratified deposits not only to provide for good ventilation—that is to say, as much as may be consistent with the employment of large bodies of men, and the opening out of material which gives off large quantities of noxious gases—but at the same time to suit the large "get" which may be required. Moreover, there are special dangers, in opening out large areas, to be guarded against, such as those disastrous phenomena which have ruined so many mines, called "creep" and "thrust," and which, when they once set in, over-run in a short time an entire district. Creep and thrust are extremely apt to accompany the working out of coal on methods more or less similar to some of those I have described, and particularly where the workings proceed in advance of the total removal of the mineral. Take, for instance, such a case as that of the Lund Hill Colliery [diagram exhibited], you will see a long range of galleries run out at right angles from the main road ways, with cross-cuts from one to the other at regular intervals, the final operation being that of removing as much as possible of the coal from the intermediate spaces.

Another plan, called "broad working," of which the Risca Colliery [plan exhibited] may be taken as an example, proposes the entire removal of the mineral, although it involves a great deal of waste. Suppose we have one of these systems, and take out half the coal with a view of afterwards taking out the other half, we shall find in many districts the roof and floor of the seam of such a character that thrust and creep will set in. This arises from the pressure on the portions that are left, and exhibits itself by the floor of the level gradually rising, and the roof gradually sinking, and this with such force in some districts as to entirely defy all the powers of resistance which any timbering can offer. When the thrust from above has gone on a little, while the pillars themselves begin to split off at the sides, and at length being thus weakened, and being no longer able to support the superincumbent weight, the levels and working places are all crushed in, and become a scene of complete and irremediable ruin. The creep may set in in the same way, and the floor begin to rise. This is observed, however, in almost all workings, and even where the openings are small. Of course, in these trivial cases the rising material is removed, and the level kept at its original dimensions, but in the case of larger openings the floor is pushed up until the entire space is filled, the timber breaks or is displaced, and the whole working is destroyed. This may extend over an entire district, and where it is not absolutely fatal, the old drifts are retained with great difficulty, vast quantities of timber having to be brought in, and expense incurred for which to the shareholders there is nothing to show. These mischiefs frequently are the result of laying out the work badly, and of adopting a system in which the proportion between the parts taken out and those left are not practically adapted to the nature of the beds. Again an extensive creep interferes materially with the road ways and air ways, the former involving great expenses to keep them open, and the latter interfering most seriously with the ventilation. Supposing the pits to be sunk in the best place as regards the working out of the material, great care must be taken not to remove any coal too near the bottom of the shafts. If this is done there is not only a great risk that the pit will deviate from the perpendicular, but the main road ways will be interfered with, the roof broken in, the pillars weakened, and, perhaps, a deadly creep set in.

The two plans exhibited (Lund Hill and Risca Collieries) show a horizontal state of things in which the great part of the mineral has to be removed, but if we go to metallic veins, where a comparatively small part is removed, the vacant spaces are generally filled up, and creep and thrust are thereby out of the question. How is this to be done with seams of coal 30 ft. thick, as in Staffordshire, or with beds of iron ore? Of course, where the seams are smaller, and intersected by beds of shale, which have to be left behind, the modes of working are modified. These "partings," as they are called, often give a great deal of trouble. It not unfrequently occurs that there will be a seam 2 ft. thick, then 1 ft. of parting, then another foot of coal, and then more parting, in which case the refuse material serves to fill up the spaces, and enables the engineer to introduce systems of working which in the case of clean seams they would not be able to adopt. It must not be supposed, however, that even in clean seams the whole mass is extracted, and any calculation of the quantity of coal to be obtained—say, from a seam 6 ft. in thickness, and so many yards in area—which did not allow for a great deal of waste would be utterly fallacious. This waste is occasioned by the operation of "holing," which creates a considerable amount of slack, and by the admixture of pieces of the roof which come down, which must be left behind, and from which very frequently the coal cannot be separated, and is, therefore, left behind, also under the appellation of "dirty coal." Again, there may be parts of seams in which the coal is of a quality which renders it unsaleable, and which, therefore, must be left behind, in which case the workings should be so managed as to abandon what is left in a state which will render it available at a further day. Again, some seams will make an immense proportion of small coal, not unfrequently as much as 50 per cent., and then it becomes an important question what to do with it. In places where it will coke readily, or where it can be used for manufacturing purposes, it is usually brought up and disposed of at a lower rate than the round coal. But if the district is one which affords no demand for such a class of fuel, and it will not coke, it can only be regarded as mere refuse, to be put aside in the gob or goaf. Small coal is always an item of loss in an extensive colliery, the best price obtainable for slack being no more than 2s. 6d. or 3s. 6d. per ton, while the round coal fetches 7s. 6d. to 10s. 6d. a ton at the pit's mouth. The mode of working to be adopted should, therefore, be devised so as to get as large a proportion of round coal as possible. This is a point which is very little considered or known beyond the coal proprietors themselves. In working some seams "smalls," although unsaleable, must be brought to surface. It is, then, a question how it shall be got rid of, and to save the cost of placing it upon the land which, of course, is covered up, and can be used for nothing else, hundreds of thousands of tons are burnt, and in some districts enormous banks of slack are burning night and day. This is a great waste and nuisance, which has been severely commented upon by some French engineers, who, however, may not have the same difficulties in the collieries of their country. There are some seams in Somersetshire which produce so much small that they are not worth working, and, as I have said, calculations based upon the mere thickness and extent of a seam are very often in this way found to be fallacious. Some coals break up naturally, and if they are stacked at the surface they are found after a little time when removed for the market to make an enormous proportion of slack. In some cases the quantity of small is much increased by the method of working, and particularly if the plan should be one which sets up an undue pressure on the pillars, it is found that when those pillars are removed their value is greatly deteriorated. Then, in the mere getting of the coal something is due to the manner of breaking it down. Undercutting of itself is productive of much waste, and it is often advisable to undercut below the coal instead of in it. This, of course, must depend upon the hardness of the ground, as it may be better to submit to the loss of a certain amount of round coal than pay the colliers extra for holing in a very hard material. And so in detaching it from the roof, to which its adhesion is sometimes very tenacious, whether by driving in wedges, or by breaking it down with hammers, or the pick, or with gunpowder, choice must be made of the plan which will produce the least slack. It has been proposed to introduce some system of forcing down the coal which shall be at once powerful and gentle in its action, and there has been very lately an ingenious plan proposed for that purpose. It is very convenient, and can easily be lifted by two men. A hole is bored in the coal, and two wedges inserted, between which a third is driven in by means of a hydraulic ram, which forces down the coal.

The principal points, then, to be considered before exploitation, besides the general circumstances of the locality, are the thickness of the seam, its depth, its strength, the character of the roof and floor, the regularity and amount of probable sale, and whether it is a home or an export trade, the facilities of conveyance to the market or place of shipment, and, lastly, the occurrence of faults—a consideration which is of the greatest moment in some districts. Thus, while North Durham is free from faults, in Flintshire they are so numerous and so close together that it is almost impossible to lay down *a priori* the form a colliery there ought to assume. Again, in Lancashire and Staffordshire the faults are well known and, generally speaking, large, and the workings may be so planned as to run in between the faults without even crossing them. And, again, when the seams come up to the surface it is not unusual to work them near the outcrop by open works, like a quarry, or by bell pits, or as the lignite beds are worked at Bovey Tracey, in Devonshire, where, having a wet, awkward material to deal with, a system is adopted of opening out large square pits, with a wall 2 or 3 ft. thick between them, and so managed that the water from two side pits can accumulate in the middle one, the division walls having to be left as waste. By this means one-half or two-thirds of the valuable material is obtained. The Derbyshire bell pits are ancient, and worked in a peculiar way. There is not a very great thickness of outcrop, and the shaft is sunk right through the bed to be worked. The bottom is then gradually widened until the opening assumes the shape of a bell or a bottle, the neck of which would represent the shaft through the overtop, and the larger part of the bottle the working of the mineral. In these cases when the whole of the mass is removed another shaft is sunk at no great distance, and the bell being scoped out until near the first one, a short level is sometimes cut between them, and thus by far the greater part of the whole deposit is won. The most remarkable bell pits in the world are those of Hungary, belonging to the Tertiary strata. In these they descend from 100 to 250 feet before they begin to work out the mineral. They open the lower sides of the shaft at an angle of 40°, constantly keeping the roof at the same angle, until at length they descend vertically, and although the excavations are vast, they are perfectly safe so long as no water gets into them. In other places the safety of these workings is greatly influenced by the course of the natural joints. I have shown you how in metalliferous mines that it may make all the difference to the security of the men whether they follow the one or the other side of a piece of ground in overhand stoping, and in the working of coal the same considerations come into play. It is very rarely indeed that coal does not show a distinct division in its structure, although this "cleat" or cleavage plane is very variable. Sometimes it is perpendicular, and only in one direction, at others it will run in different directions, and across each other, as, for instance, what is called cubical coal, because the cleat crosses it diagonally, which is found over a large district. I shall not go into the geological causes of this, but the result will be very important in the working of a seam. You will find in certain collieries where the cleavage runs (say) from west to east, the workings are arranged accordingly, and the cost of getting is far less than it would be if the cleat were not taken advantage of. Following the guidance of the cleat may also reduce greatly the quantity of "smalls." Some of these cleats are very curious, and in Leicestershire and Derbyshire, where the direction is usually the same, it is very marked indeed as compared with the line of structure; and where in consequence the working is carried on in long faces, often 25 feet in length, the great thing being to make the attack at that point which will give them the greatest advantage from this natural peculiarity—driving out the levels from the pit, and working the underdip by what is called a "downbrow." Another plan is to sink the shaft further down, and drive out till the seam is met, and then work it to the rise. The choice between these two plans must depend upon local circumstances, amongst which the presence of water or of explosive gases will be important.

SOUTH MIDLAND INSTITUTE OF MINING, CIVIL, AND MECHANICAL ENGINEERS.

At a meeting of the South Midland Institute of Mining, Civil, and Mechanical Engineers, at the Wolverhampton School of Practical Art, on Monday, Mr. H. BECKETT, F.G.S., presided; and amongst others present were Messrs. J. P. Baker (Mines Inspector), Thomas Rose, H. J. Marten, J. Ferriday, C. Bikker, H. F. Griffiths, Thomas Walker, W. Blakemore, S. Bowkley, J. Spittle, J. Bromley, G. Hyde, J. Meacham, J. Loxton, J. Hodgkiss, A. Bowkley, B. P. Walker, J. Cope (secretary), &c. Several additional members were elected.

The CHAIRMAN stated that he, with the secretary and Mr. Smith, went to the district between Coven and Calf Heath, according to the directions of the last meeting, and they found some very old people there, who said that several years ago borings were made, and coal was found nearly 4 ft. thick at about 70 yards below the surface. He could not believe it himself.—Mr. BAKER: Some one put it down the hole if it was found at all.—The CHAIRMAN: That has often been done.

Mr. BAKER remarked that he remembered sinkings being made in a certain district something like 900 ft.—by a company, he should say—and at that depth it was reported there was coal. The shares, of course, went up amazingly, but it afterwards turned out to be a hoax, the coal simply having been put down the shaft, and then pulled up again. It was his opinion in this case that if the coal were really found at Coven it was put down first.

The CHAIRMAN said he thought they would have to go down some 2000 ft. before they got any. He could not recommend that the members of the Institute should make an excursion to Coven Heath, with a view of examining the ground. He thought, however, that some examinations should be made of Penn Common, underneath which, and indeed beneath the Wolverhampton Racecourse, he had no doubt whatever that coal existed, at a depth not beyond the means of working available in modern times. Each place would be far enough from the known fields of Staffordshire and Shropshire to assist materially in establishing the existence of coal between South Staffordshire and Shropshire.

Mr. MARTEN: Then it is the opinion of the meeting, I suppose, that we hardly need trouble that district (Coven)?—The CHAIRMAN replied that he thought not.

Mr. BAKER recommended that application should be made to Mr. Stokes, of Saredon, for permission to inspect sections of borings made at a place called Lowney Green on the Ordnance Map, about 20 years ago. That would be very nearly a mile, he thought (as the crow flies), over the great western boundary fault from the working coal bed in the neighbourhood of Wyrley and Cheslyn Hay. The borings, as far as he could recollect, were very encouraging indeed; and if they met with Mr. Stokes they would find he was fully convinced that coal would be found there at no very great depth.——The CHAIRMAN, on learning that the boring was only 70 yards, said that would not assist them much. It would, however, be advantageous to have as many such sections as possible, and he would himself bring several to the next meeting.——Mr. BAKER said that was the locality to which he thought attention should be drawn, as the borings were so favourable. Mr. Stokes had got the section, and no doubt Mr. Bright, the late steward of Teddesley, would have a copy. So confident was one proprietor of property there that coal existed on his estate that the commencement of sinkings awaited only his (Mr. Baker's) fixing the best spot for the trial.—The deputation were thanked for the information they had afforded as to Coven, and on the motion of Mr. Marten, a deputation was appointed to report upon Calf Heath and Penn Common, with a view, if desirable, of an excursion of the Institute being made to those localities. The deputation appointed consisted of the president and hon. secretary, with Mr. Baker, Mr. Spittle, Mr. Bowkley, and Mr. Marten. Members who possessed plans of boring of any part of the at present unexplored district were desired to assist the deputation by the loan of such documents.

Mr. S. BOWKLEY laid before the Institute a section showing the identity and relative position of mines in the Shropshire and South Staffordshire coal fields. He thought if they once established the identity there would be very little difficulty in establishing the continuity of the measures.——The CHAIRMAN and other members expressed their concurrence with Mr. Bowkley's views, and a vote of thanks was accorded to him for his kindness in preparing the section.

The CHAIRMAN next read an interesting paper on certain lead deposits over an extensive tract of North Wales, and produced plans showing the relative mode of working.

Mr. B. P. WALKER asked the aid of the Institute in promoting the movement for the establishment of a School of Arts and Science in Wolverhampton. The surplus funds (he said) from the late Exhibition were divided between the South Staffordshire Adult Educational Association and the School of Art; but in order to get Government assistance, and save the school from being sold, a sum of something like 500*l.* was yet required to be raised by the public. He did not think they could be doing a greater service than in promoting the establishment of such an institution.—Some discussion ensued on the subject, and it was ultimately agreed that the president and secretary, with Mr. Griffiths, should wait on the executive committee appointed to carry out the scheme.

There was no other business, and after a vote of thanks had been accorded to the Chairman—both for the information he had afforded on the working of lead mines in North Wales and for presiding—the meeting terminated.

—*Wolverhampton Chronicle.*

ROYAL CORNWALL POLYTECHNIC SOCIETY.—The annual report of this society has just been issued, and contains a number of papers of considerable practical value—those "On Mineral Veins," by Mr. Benedict Kitto, of the Breage Science class, and by Mr. A. K. Barnett, "On Mineral Phenomena," which we publish in another column, being especially worthy of commendation. The Rev. John Bannister's paper "On Cornish Names" will also be read with much interest. Mr. Cocks's paper "On Falmouth Fauna" is a valuable addenda of former years. In addition to these, there are papers "On the Wire Tramway," which is described in the report of council as "one of the most ingenious modes of conveyance that has yet been invented. . . . Its advantages are simplicity and cheapness of construction and action." A new self-acting calciner is described by Messrs. Oxland and Hocking, and Mr. Charles Fox contributes a paper "On the Royal Cornwall Polytechnic Society." The report will well repay attentive study.

Sir Alfred Slade, Bart., has joined the board of directors of the Monte Albo Mining Company (Limited). He represents a large lead manufacturing interest in the North of England.

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